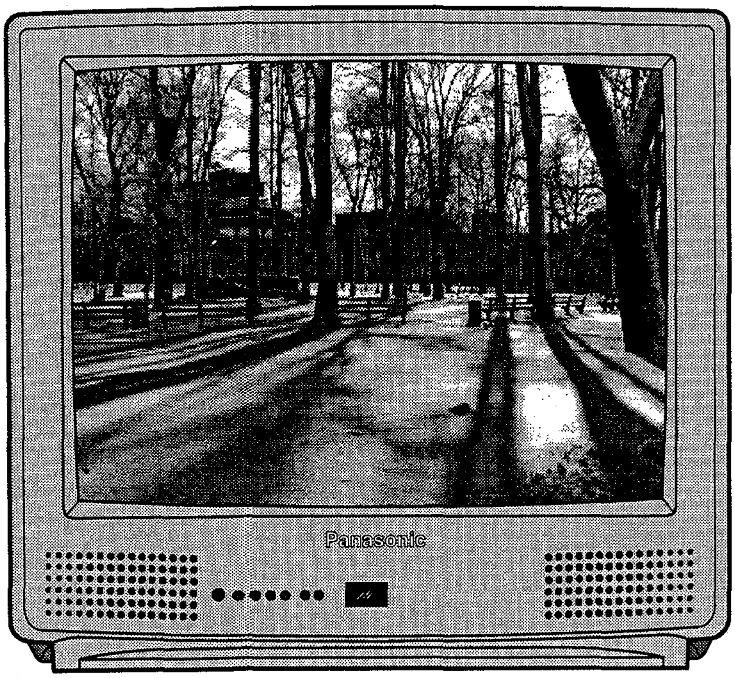
ORDER NO. MTC9704699C1
B5

Service Manual

Color Television



Main Manual
(NA6D)

Panasonic

Models	Chassis
CT–32G12V	AMEDP282
CT–32G12UV	AMEDP282
CT–32G12CV	AMEDP282
CT–32G22V	ANPEDP282
CT–32G22UV	ANPEDP282
CT–32G22CV	ANPEDP282

NOTE: Model **CT–32G12UV** is identical to the **CT–32G12V** and model **CT–32G22UV** is identical to the **CT–32G22V** except for the magnetic field used in the factory to adjust **purity** and **convergence** for different markets.

This *Service Manual* is issued as a service guide for the models of the NA6D family listed above. Included in this manual are a set of schematics, operations overview, alignment procedures, disassembly procedures, and a complete parts list.

Note: Please refer to **NA6D/L Technical Guide (MTC9702684G1)** for functional descriptions and block diagrams.

"**WARNING!** This Service Manual is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non–technical individuals of potential dangers in attempting to service a product. **Products powered by electricity should be serviced or repaired only by experienced professional technicians.** Any attempt to service or repair the product or products dealt with in this Service Manual by anyone else could result in serious injury or death."

The service technician is required to read and follow the "**Safety Precautions**" and "**Important Safety Notice**" in this manual.

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Important Safety Notice

Special components are used in this television set which are important for safety. These parts are identified on the schematic diagram by the symbol ⚠ and printed in **BOLD TYPE** on the replacement parts list. It is essential that these critical parts are replaced with the manufacturer's specified replacement parts to prevent X–ray radiation, shock, fire or other hazards. Do not modify the original design without the manufacturer's permission.

Safety Precautions

General Guidelines

An **Isolation Transformer** should always be used during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect the Receiver from being damaged by accidental shorting that may occur during servicing.

When servicing, observe the original lead dress, especially in the high voltage circuit. Replace all damaged parts (also parts that show signs of overheating.)

Always Replace Protective Devices, such as fishpaper, isolation resistors and capacitors, and shields after servicing the Receiver. Use only manufacturer's recommended rating for fuses, circuit breakers, etc.

High potentials are present when this Receiver is operating. Operation of the Receiver without the rear cover introduces danger from electrical shock. Servicing should not be performed by anyone who is not thoroughly familiar with the necessary precautions when servicing high–voltage equipment.

Extreme care should be practiced when **Handling the Picture Tube**. Rough handling may cause it to implode due to atmospheric pressure (14.7 lbs per sq. in.). Do not nick or scratch the glass or subject it to any undue pressure. When handling, use safety goggles and heavy gloves for protection. **Discharge the picture tube** by shorting the anode to chassis ground (not to the cabinet or to other mounting hardware). When discharging, connect cold ground (i.e. dag ground lead) to the anode with a well insulated wire or use a grounding probe.

Avoid prolonged exposure at close range to unshielded areas of the picture tube to prevent exposure to X–ray radiation.

The **Test Picture Tube** used for servicing the chassis at the bench should incorporate safety glass and magnetic shielding. The safety glass provides shielding for the tube viewing area against X–ray radiation as well as implosion. The magnetic shield limits X–ray radiation around the bell of the picture tube in addition to restricting magnetic effects. When using a picture tube test jig for service, ensure that the jig is capable of handling 37.2kV without causing X–ray radiation.

Before returning a serviced receiver to the owner, the service technician must thoroughly test the unit to ensure that it is completely safe to operate. **Do not use a line isolation transformer when testing.**

Leakage Current Cold Check

Unplug the AC cord and connect a jumper between the two plug prongs.

Measure the resistance between the jumpered AC plug and exposed metallic parts such as screwheads, antenna terminals, control shafts, etc. If the exposed metallic part has a return path to the chassis, the reading should be between 240kΩ and 5.2MΩ. If the exposed metallic part does not have a return path to the chassis, the reading should be infinite.

Leakage Current Hot Check (See Figure 1)

Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during the check.

Connect a 1.5kΩ 10 watt resistor in parallel with a 0.15μF capacitor between an exposed metallic part and ground. Use earth ground, for example a water pipe.

Using a DVM with a 1000 ohms/volt sensitivity or higher, measure the AC potential across the resistor.

Repeat the procedure and measure the voltage present with all other exposed metallic parts.

Verify that any potential does not exceed 0.75 volt RMS. A leakage current tester (such as a Simpson Model 229, Sencore Model PR57 or equivalent) may be used in the above procedure, in which case any current measure must not exceed 1/2 milliamp. If any measurement is out of the specified limits, there is a possibility of a shock hazard and the Receiver must be repaired and rechecked before it is returned to the customer.

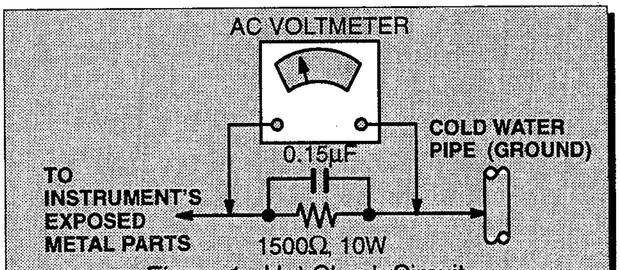

Figure 1. Hot Check Circuit

X–ray Radiation

WARNING: The potential source of X–ray radiation in TV sets is in the High Voltage section and the picture tube.

NOTE: It is important to use an accurate, calibrated high voltage meter.

Set the **brightness, picture, sharpness** and **color** controls to Minimum.

Measure the High Voltage. The high voltage meter should indicate 29.25kV for. If the upper limit is out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature component failure.

Horizontal Oscillator Disable Circuit Test

This test must be performed as a final check before the Receiver is returned to the customer. See **Horizontal Oscillator Disable Circuit Procedure Check** in this manual.

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Service Notes

NOTE: ***These components are affixed with glue. Be careful not to break or damage any foil under the component or at the pins of the ICs when removing. Usually applying heat to the component for a short time while twisting with tweezers will break the component loose.***

Leadless Chip Components (surface mount)

Chip components must be replaced with identical chips due to critical foil track spacing. There are no holes in the board to mount standard transistors or diodes. Some chip capacitor or resistor board solder pads may have holes through the board, however the hole diameter limits standard resistor replacement to 1/8 watt. Standard capacitors may also be limited for the same reason. It is recommended that identical chip components be used.

Chip resistors have a three digit numerical resistance code – 1st and 2nd significant digits and a multiplier. Example: 162 = 1600 or 1.6KΩ resistor, 0 = 0Ω (jumper).

Chip capacitors generally do not have the value indicated on the capacitor. The color of the component indicates the general range of the capacitance.

Chip transistors are identified by a two letter code. The first letter indicates the type and the second letter, the grade of transistor.

Chip diodes have a two letter identification code as per the code chart and are a dual diode pack with either common anode or common cathode. Check the parts list for correct diode number.

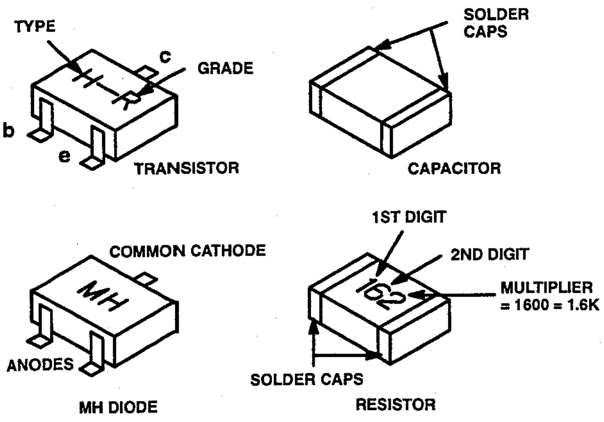
Component Removal

1. Use solder wick to remove solder from component end caps or terminals.
2. Without pulling up, carefully twist the component with tweezers to break the adhesive.
3. Do not reuse removed leadless or chip components since they are subject to stress fracture during removal.

Chip Component Installation

1. Put a small amount of solder on the board soldering pads.
2. Hold the chip component against the soldering pads with tweezers or with a miniature alligator clip and apply heat to the pad area with a 30 watt iron until solder flows. Do not apply heat for more than 3 seconds.

Chip Components

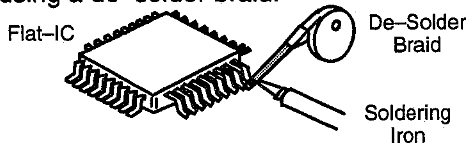

TYPE
C
GRADE
b
e
TRANSISTOR
SOLDER CAPS
CAPACITOR
COMMON CATHODE
MH
ANODES
MH DIODE
1ST DIGIT
2ND DIGIT
162
MULTIPLIER
= 1600 = 1.6K
SOLDER CAPS
RESISTOR

How to Replace Flat–IC

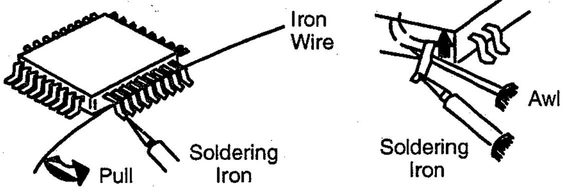
– Required Tools –

- Soldering iron
- De–solder braids
- Iron wire or small awl
- Magnifier

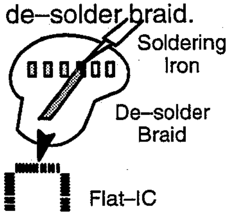
1. Remove the solder from all of the pins of a Flat–IC by using a de–solder braid.


Flat–IC
De–Solder Braid
Soldering Iron

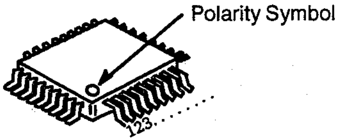
2. Put the iron wire under the pins of the Flat–IC and pull it in the direction indicated while heating the pins using a soldering iron. A small awl can be used instead of the iron wire.


Iron Wire
Pull
Soldering Iron
Awl
Soldering Iron

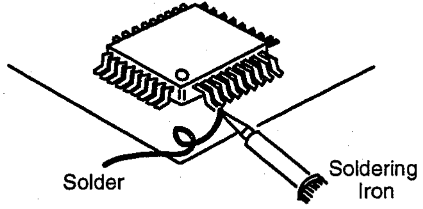
3. Remove the solder from all of the pads of the Flat–IC by using a de–solder braid.


Soldering Iron
De–solder Braid
Flat–IC

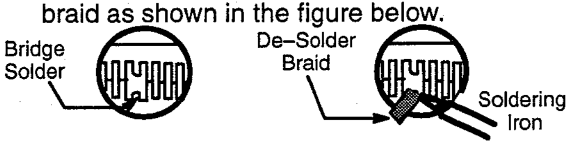
4. Position the new Flat–IC in place (apply the pins of the Flat–IC to the soldering pads where the pins need to be soldered). Properly determine the positions of the soldering pads and pins by correctly aligning the polarity symbol.


Polarity Symbol
123

5. Solder all pins to the soldering pads using a fine tipped soldering iron.


Solder
Soldering Iron

6. Check with a magnifier for solder bridge between the pins or for dry joint between pins and soldering pads. To remove a solder bridge, use a de–solder braid as shown in the figure below.


Bridge Solder
De–Solder Braid
Soldering Iron

Service Notes (Continued)

IMPORTANT: To protect against possible damage to the solid state devices due to arcing or static discharge, make certain that all ground wires and CRT DAG wire are securely connected.

CAUTION: The power supply circuit is above earth ground and the chassis cannot be polarized. Use an isolation transformer when servicing the Receiver to avoid damage to the test equipment or to the chassis. Connect the test equipment to the proper ground (⏚) or (⊥) when servicing, or incorrect voltages will be measured.

WARNING: This Receiver has been designed to meet or exceed applicable safety and X–ray radiation protection as specified by government agencies and independent testing laboratories.

To maintain original product safety design standards relative to X–ray radiation and shock and fire hazard, parts indicated with the symbol ⚠ on the schematic must be replaced with identical parts. Order parts from the manufacturer's parts center using the part numbers shown in this service manual, or provide the chassis number and the part reference number.

For optimum performance and reliability, all other parts should be replaced with components of identical specifications.

Horizontal Oscillator Disable Circuit

This chassis employs a special circuit to protect against excessive high voltage and beam current. If, for any reason, the high voltage and beam current exceed a predetermined level this protective circuit activates and detunes the horizontal oscillator that limits the high voltage.

The over–voltage protection circuit is not adjustable. However, if components indicated by the symbol ⚠ on the schematic in either the horizontal sweep system or the over–voltage protection circuit itself are changed, the operation of the circuit should be checked using the following procedure.

Equipment needed to check the disable circuit:

1. Voltmeter (0 – 200V scale)
2. High Voltage Meter (0 – 40kV)
3. Variac or Isolation Transformer

Procedure:

1. Tune in a station to verify that the horizontal is in sync.
2. Obtain a Monoscope pattern or a signal generator crosshatch pattern.
3. Connect the voltmeter (–) lead to TPD2 and the (+) lead to TPD1 (junction of D555 anode, R556 & R557). Set **Bright** level to (0) and **Picture** for a 1.8 volt reading on the voltmeter.
4. Turn the Receiver OFF. Connect a jumper across IC803 pin 3 and pin 4.
5. Reduce the AC supply voltage to approximately 45V. Connect the high voltage meter to the CRT anode (H.V. button). **NOTE:** Use the Dag Ground (C10 of the CRT Board) to connect the (–) lead of the meter.
6. Turn the Receiver ON. Slowly increase the AC supply voltage and verify that the high voltage does not exceed **37.2kV** when horizontal just begins to pull out of sync. If the high voltage is not within the specified limit, the cause must be determined and corrected before the Receiver is returned to the customer.

Feature Table

FEATURE \ MODEL	CT–32G12V/UV	CT–32G12CV	CT–32G22V/UV	CT–32G22CV
Chassis	NA6D	NA6D	NA6D	NA6D
# of channels / Phase	181 / PH22M	181 / PH22M	181 / PH22M	181 / PH22M
Menu language	ENG /SPAN/ FR	ENG /SPAN/ FR	ENG /SPAN/ FR	ENG /SPAN/ FR
Closed Caption	X	X	X	X
# of PIP tuners	NONE	NONE	1T	1T
75 Ω input	X	X	X	X
Remote Model #	EUR511000A	EUR511000A	EUR511051	EUR511051
Picture tube	M80JUA061X	M80JUA061X	M80JUA061X	M80JUA061X
Black face regular tube	X	X	X	X
Notch filter	GLASS	GLASS	GLASS	GLASS
Notch filter	P	P	P	P
Video or Audio norm Switch (X=both)	V	V	X	X
MTS/SAP/DBX	X	X	X	X
Built–in audio power	1.5W X 2 (10%)	1.5W X 2 (10%)	1.5W X 2 (10%)	1.5W X 2 (10%)
# of speakers	2	2	2	2
Bass/Bl/Tre Control	X	X	X	X
AI sound (simple)	X	X	X	X
Surround	X	X	X	X
A/V in (rear/front)	1/0	1/0	2/0	2/0
Fixed audio out	X	X	X	X
Variable audio out	X	X	X	X
S–VHS input (rear/front)	1/0	1/0	1/0	1/0
Dimensions mm (HxWxD) in	694 x 770 x 537 27.4 x 30.3 x 21.1	694 x 770 x 537 27.4 x 30.3 x 21.1	694 x 770 x 537 27.4 x 30.3 x 21.1	694 x 770 x 537 27.4 x 30.3 x 21.1
Weight (kb / lb)	49.9 / 113.0	49.9 / 113.0	49.9 / 113.0	49.9 / 113.0
Power soruce (V / Hz)	120 / 60	120 / 60	120 / 60	120 / 60
Power consumption, Max (A)	2.2	2.2	2.2	2.2
Anode voltage	29.25kV ± 1.25kV	29.25kV ± 1.25kV	29.25kV ± 1.25kV	29.25kV ± 1.25kV
Video input jack	$1V_{p-p}$ 75Ω, phono jack	$1V_{p-p}$ 75Ω, phono jack	$1V_{p-p}$ 75Ω, phono jack	$1V_{p-p}$ 75Ω, phono jack
Audio input jack	500mV RMS, 47kΩ	500mV RMS, 47kΩ	500mV RMS, 47kΩ	500mV RMS, 47kΩ
To audio out jack	0~2.0V RMS, 4.7kΩ	0~2.0V RMS, 4.7kΩ	0~2.0V RMS, 4.7kΩ	0~2.0V RMS, 4.7kΩ
"A"–Board TNP2AH004	BF	BK	BD	BL
"C"–Board TNP2AA006	AC	AC	NIL	NIL
"X"–Board TNP2AA007	–	–	AB	AB
"X"–Board TNP2AA008	NIL	NIL	–	–
"Y"–Board TNP2AA009	–	–	AB	AB

Table 1. **Receiver Features**

Specifications are subject to change without notice or obligation.
Dimensions and weights are approximate.

Location of Controls, Receiver

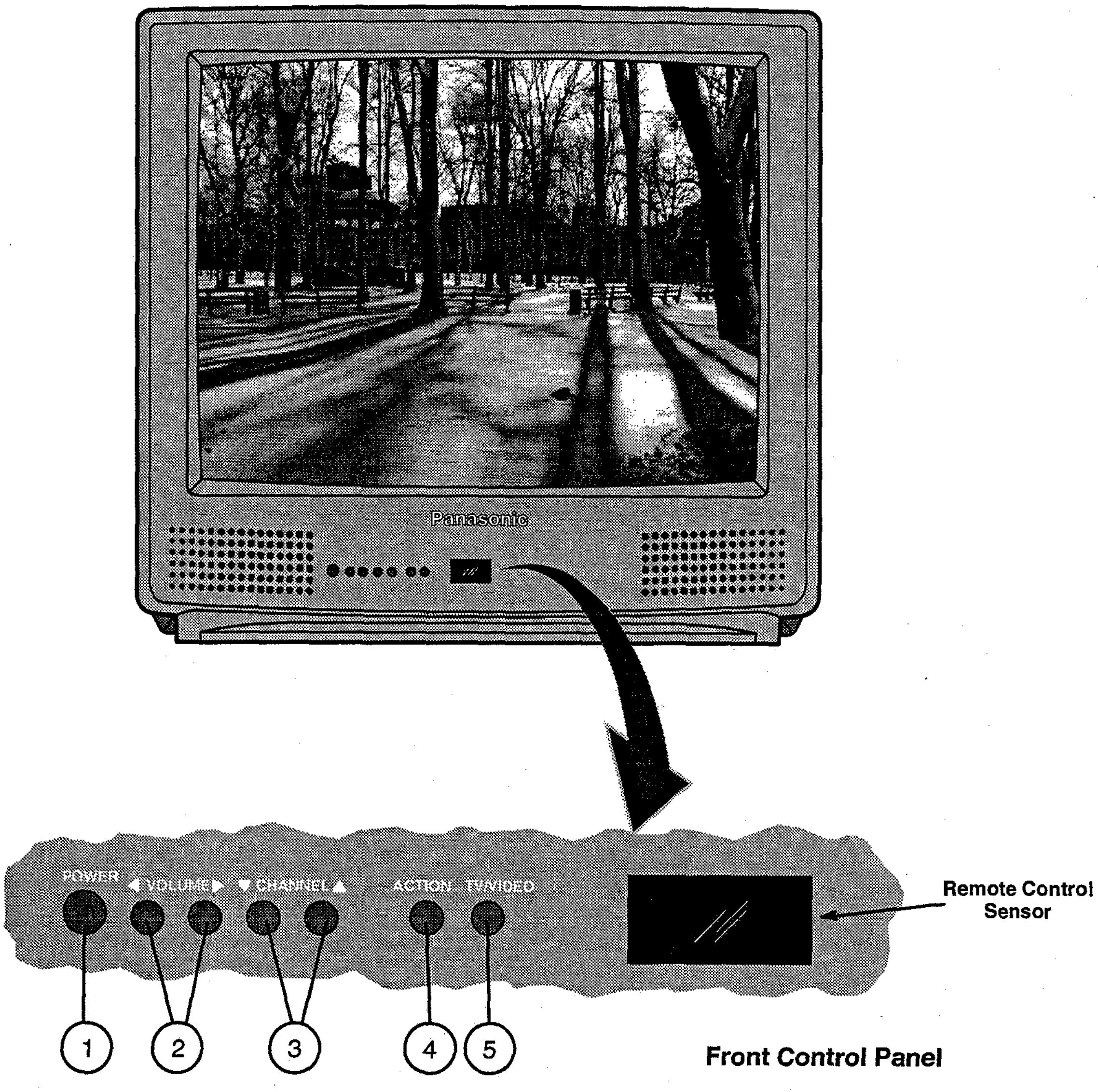

Panasonic
POWER
◄ VOLUME ►
▼ CHANNEL ▲
ACTION
TV/VIDEO
Remote Control Sensor
①
②
③
④
⑤
Front Control Panel

Figure 2. **Location of controls, receiver**

① **Power Button** – Press to turn ON or OFF.

② **Volume Buttons** – Press to adjust Sound Level. Press to adjust Video Menus and select operating features when menus are displayed.

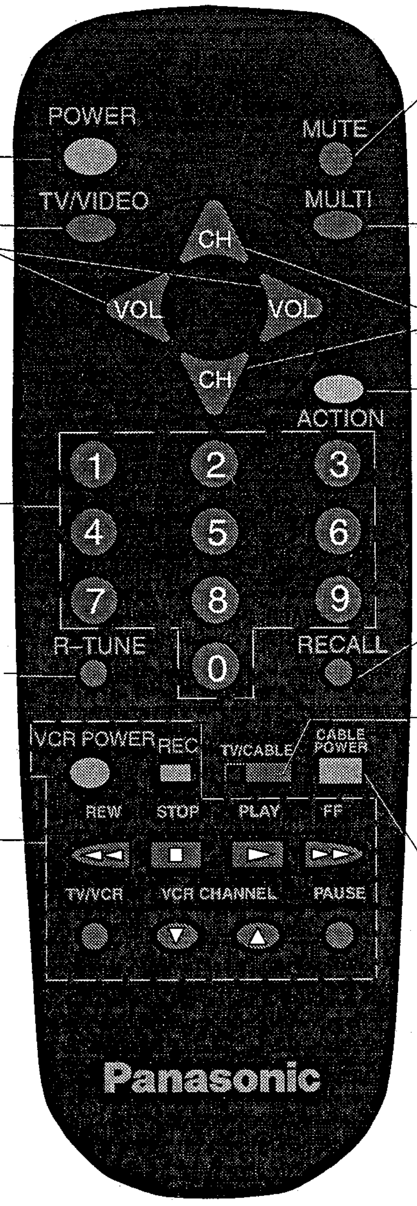
③ **Channel Buttons** – Press to select programmed channels. Press to highlight desired features when menus are displayed.

④ **Action Button** – Press to display Main Menu and access On Screen feature and Adjustment Menus.

⑤ **TV/Video Button** – Press to select TV or Video Input.

Location of Controls Remote

(For CT–32G12/U/C)


POWER
MUTE
TV/VIDEO
MULTI
CH
VOL
VOL
CH
ACTION
1
2
3
4
5
6
7
8
9
R-TUNE
0
RECALL
VCR POWER
REC
TV/CABLE
CABLE POWER
REW
STOP
PLAY
FF
TV/VCR
VCR CHANNEL
PAUSE
Panasonic

EUR511000A

Power Button
Press to turn ON or OFF.

TV/Video Button
Press to select TV or Video Input.

Volume Buttons
Press to adjust TV sound level. Use with Channel buttons to navigate in menus.

Keypad Buttons
Press desired channel number to randomly access any channel.

R–Tune (Rapid Tune) Button
Press to switch to the previous channel.

VCR Function Buttons
Programmable to operate many brands of VCR's.

Mute Button
Press to mute sound. A second press resumes sound. Press also to access and delete Closed Caption.

Multi Button
Programmable to operate up to six Remote Control Function buttons simultaneously.

Channel Buttons
Press to select channels. Use with Volume buttons to navigate in menus.

Action Button
Press to display Main Menu and access or exit On Screen feature and Adjustment Menus.

Recall Button
Press to display Time, status of Sleep Timer, Channel, Video Mode, Channel Caption (Station Identifier) and Audio Mode.

TV/Cable Switch – This switch is used to select the proper mode when programming Remote Control Infrared codes or operating the TV or external equipment (VCR or Cable Converter box).

Cable Power Button – Programmable to operate selected CATV converter boxes.

Programming The Universal Remote

(For CT-32G12/U/C)

VCR

Preferred Procedure – Code Known

Programming Universal Remote Using Infra-Red Access Codes for VCRs

- Determine brand of VCR.
- Identify code(s) associated with the brand in the infra-red code index for VCRs (located in this manual).

Procedure

1. Place the Remote TV/CABLE ◧ into the TV position (Left).
2. Press and hold VCR POWER ○ down on Universal Remote.
3. Enter two digit code using keypad "0 through 9" buttons. Release VCR POWER ○. The Universal Remote is now programmed.

NOTE: Some brands have multiple codes. Repeat procedure using each code listed until VCR responds correctly.

Alternate Procedure – Code Unknown

Programming Universal Remote Using the "Sequence Method" for VCRs

- Confirm VCR is plugged in and operating properly, then turn OFF.

Procedure

1. Place the Remote TV/CABLE ◧ into the TV position (Left).
2. Press and hold the VCR POWER ○ down on Universal Remote.
3. Press VOL ▷ repeatedly. Check for the VCR to turn ON after each press. When the VCR turns ON, release VCR Power button. The proper infra-red code has now been accessed.

- It may take several attempts before the correct code is found.
- The ◁ VOL can be used to return to a code that was accidently passed by.
- Some Remote Controls may have unique operating functions for some buttons. For Example: The POWER button may only turn the VCR OFF as opposed to both ON and OFF. It will then be necessary to modify the procedure. Turn the VCR ON and repeatedly press the VOL ▷ until the VCR turns OFF.

Cable Converter Box

Preferred Procedure – Code Known

Programming Universal Remote Using Infrared Access Codes for Cable Television Converter Boxes

- Determine brand of Cable Television Converter box.
- Identify code(s) associated with the brand in the infra-red code index for Cable Television Converter boxes (located in this manual).

Procedure

1. Place the Remote TV/CABLE ◨ into the CABLE position (Right).
2. Press and hold the CABLE POWER ☐ down on Universal Remote.
3. Enter two digit code using keypad "0 through 9" buttons. Release CABLE POWER ☐. The Universal Remote is now programmed. **Use the Remote CH △ and CH ▽ for selecting Cable Converter Box channels.**

NOTE: Some brands have multiple codes. Repeat procedure using each code listed until Cable Television Converter box responds correctly.

Alternate Procedure – Code Unknown

Programming Universal Remote Using the "Sequence Method" for Cable Television Converter Boxes

- Confirm Cable Television Converter box is plugged in and operating properly, then turn OFF.

Procedure

1. Place the Remote TV/CABLE ◨ into the CABLE position (Right).
2. Press and hold CABLE POWER ☐ down on Universal Remote.
3. Press VOL ▷ repeatedly. Check for the Cable Television Converter box to turn ON after each press. When the Cable Television Converter box turns ON, release Cable Power button. The proper infrared code has now been accessed.

- It may take several attempts before the correct code is found.
- The ◁ VOL can be used to return to a code that was accidently passed by.
- Some Remote Controls may have unique operating functions for some buttons. For Example: The POWER button may only turn the Cable Television Converter box OFF as opposed to both ON and OFF. It will then be necessary to modify the procedure. Turn the Cable Television Converter box ON and repeatedly press the VOL ▷ until the Cable Television Converter box turns OFF.

NOTE: When operating equipment (VCR or Cable Converter box) with the Universal Remote Control, the TV/CABLE Switch should be set to the same position where the Access Code was first programmed for the equipment. Otherwise, leave the switch in the TV position.

VCR and Cable Converter Box Infrared Codes Index

(For CT–32G12/U/C)

The Universal infrared Remote Control is capable of operating many brands of VCRs and Cable Television Converter Boxes after entering the proper infrared code.

NOTE: The Universal Remote Control memory is limited. Some models of VCRs or Cable Television Converter Boxes may not operate. The Universal Remote Control is not designed to control all features that are available in all models.

Infrared Code Index For VCRs

VCR Brand	Code(s)	VCR Brand	Code(s)
Audio Dynamics	14, 16	NEC	02, 14, 16, 30
Broksonic	10	Panasonic	00, 01
Canon	00, 01	Pentax	05
Capehart	01	Philco	00, 29
Citizen	09	Philips	00, 29
Craig	12	Pioneer	05
Curtis Mathes	00, 08, 15	Quasar	00, 01
DBX	14, 16	RCA	05, 07, 08, 28, 35
Emerson	10, 20, 34, 35, 36, 37	Realistic	00, 02, 06, 12, 15
Fisher	12, 18, 19	Samsung	07, 32
Funai	15	Sanyo	02, 12
GE	00, 07, 08, 32	Scott	04, 13, 33, 36
Goldstar	09	Sears	02, 05, 18, 19
Hitachi	05, 35, 36	Sharp	06, 24
Instant Replay	00	Sony	17, 26, 33, 34
JC Penney	00, 02, 05, 14, 16, 30	Sylvania	00, 29
JVC	02, 14, 16, 30	Symphonic	15
Kenwood	02, 14, 16, 30	Tashiko	09
Magnavox	00, 29	Tatung	30
Marantz	02, 14, 16, 29, 30	Teac	15, 30
Marta	09	Teknika	21
Memorex	00, 12	Toshiba	05, 13
MGA	04, 27	Vector Research	14, 16
Minolta	05	Video Concepts	14, 16
Mitsubishi	04, 27	Wards	06
Montgomery Ward	06	Yamaha	02, 14, 16, 30
Multitech	07, 15, 32	Zenith	11, 17

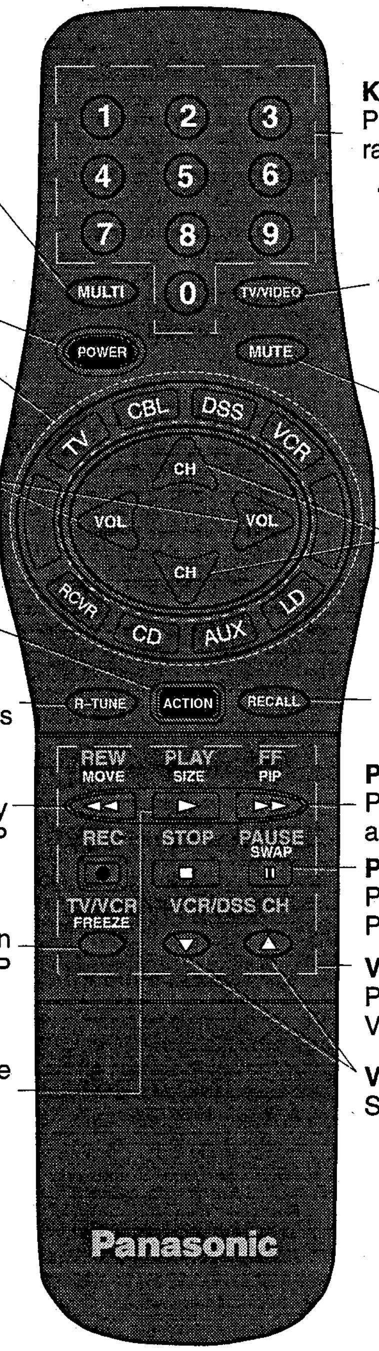
Infrared Code Index For Cable Television Converter Box

Brand of Cable–TV Box	Code(s)	Brand of Cable–TV Box	Code(s)
G.I.	04, 05, 15, 23, 24, 25, 30, 36	Pioneer	18, 20
Hamlin	12, 13, 34	RCA	27
Jerrold	04, 05, 15, 23, 24, 25, 30, 36	Regency	02
Macom	27	Scientific Atlantic	03, 22
Magnavox	19, 26, 28, 29, 32, 33, 40, 41	Sylvania	11
Oak	14,16, 18	Texscan	10, 11
Oak Sigma	16	Tocom	17, 21
Panasonic	27, 39	Unika	31
Philips	19, 26, 28, 29, 32, 33, 40, 41	Viewstar	19, 26, 28, 29, 32, 33, 40, 41
		Zenith	01, 42

Location of Controls (Remote)

Basic Remote Control Functions

The following is an overview of the Remote Control unit **for television operation. Ensure the TV mode is selected by initially pressing** . **(FOR CT-32G22/C/U)**



Multi Button
Programmable to operate up to six Remote Control Function buttons simultaneously.

Power Button
Press to turn ON or OFF.

Mode Selection Buttons
Select the operation mode for the remote control.

Volume Buttons
Press to adjust TV sound level. Use with Channel buttons to navigate in menus.

Action Button
Press to display Main Menu and access or exit On Screen feature and Adjustment Menus.

R–Tune (Rapid Tune) Button
Press to switch to the previous channel.

PIP Move Button
Press to position PIP frame to any corner of the Main Picture (when PIP frame is displayed).

PIP Freeze Button
Press to stop action in the Main Picture or PIP frame (when the PIP frame is displayed).

PIP Size Button
Press to select size of PIP frame (when the PIP frame is displayed).

Keypad "0 through 9" Buttons
Press desired channel number to randomly access any channel.

TV/Video Button
Press to select TV or one of two Video Inputs, for the Main Picture or the PIP frame (when the PIP frame is displayed).

Mute Button
Press to mute sound. A second press resumes sound.

Channel Buttons
Press to select channels. Use with Volume buttons to navigate in menus.

Recall Button
Press to display Time, status of Sleep Timer, Channel, Video Mode, Channel Caption (Station Identifier) and Audio Mode.

PIP (Picture In Picture) Button
Press to display the PIP frame, press again to remove PIP frame.

PIP Swap Button
Press to interchange PIP frame with Main Picture (when the PIP frame is displayed).

VCR Function Buttons
Programmable to operate many brands of VCR's.

VCR/DSS (PIP) Channel Buttons
Select VCR or DSS Up/Down channels.

Home Theater Remote Control
EUR511051

Note:
For more information on the Remote Control, please refer to the Remote Control Quick Reference Functional Key Chart.

Helpful Hints:
If the selected component does not respond to the remote control, ensure that the proper mode is selected. **First**, press the **Mode Selection Button** that corresponds to that component. For example, after first pressing the TV Mode Button, the remote will remain in the TV mode for the following commands. If a different mode button is pressed while operating the television, the TV mode button must be pressed again to enable the TV mode condition.

Programming the Home Theater Remote

(FOR CT-32G22/C/U)

The remote control can be set to control other manufacturers components, by utilizing the **MODE SELECTION BUTTONS** for **CABLE**, **DSS**, **VCR**, **RCVR** (a **Receiver** or **Amplifier**), **CD**, **LD**, and **AUX** (for **Cassette Deck, Second VCR** or a **DVD**.)

Code Known

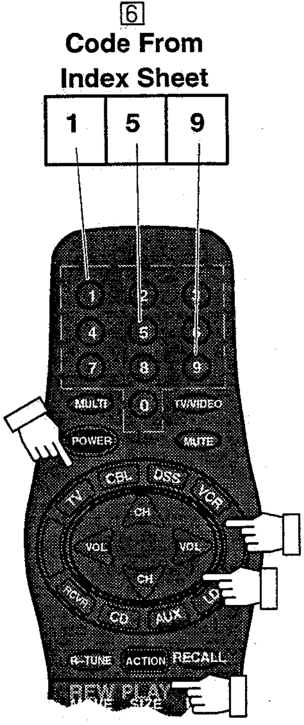
Use the following procedure for setting up the remote control using the numerical buttons when the component's remote code is known.

1. Determine the brand of the component.
2. Identify the code(s) associated with the brand from the infrared code index (see following pages). Record all possible codes.
3. Confirm that the component is plugged in and operating properly, then turn it OFF.
4. **Press and hold the ACTION button, then the POWER button so that both are pressed at the same time for at least 5 seconds.** Then let go of the buttons.
5. **Press the appropriate Mode button for the component.**
6. **Enter the 3-digit code, by using the Remote Control Keypad "0" through "9" buttons.**

Now the remote is set for the entered code.

7. **Press the POWER button to test the remote. If the correct code is setup for the component (in step 6), the component will turn on.**

NOTE: Some brands have multiple codes. Repeat the procedure using another listed code until the component responds correctly.



EUR511051

Code Unknown

Use the following procedure for setting up the remote control when the component's remote access code is not known. This procedure uses the "sequence method".

1. Confirm that the component is plugged in and operating properly, then turn it OFF.
2. **Press and hold the ACTION button, then the POWER button so that both are pressed at the same time for at least 5 seconds.** Then let go of the buttons.
3. **Press the appropriate Mode button for the device.**
4. **Press the VOL button to step over to the next code.**
5. **Press the POWER button to test the remote. If the correct code is sent, the component will turn on.**
6. **Once the correct code is found, press the ACTION button to store the code.**
7. Repeat from step 3 above until the proper component code is found. It may take several attempts before the correct code is found.

NOTE: If an incorrect code is entered, or when the operation is not completed within 30 seconds, the settings will not change.

Infrared Remote Codes for Specific Components

Helpful Hint: Write down the code numbers for your components in the space provided below. This will serve as a handy reference whenever you need to reprogram your remote control.

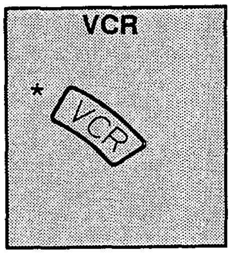
CABLE Cable TV Converter Box	☐☐☐	**VCR** Video Cassette Recorder	☐☐☐	**CD** Compact Disc Player	☐☐☐
DSS Digital Satellite System	☐☐☐	**RCVR** Receiver or Amplifier	☐☐☐	**LD** Laser Disc Player	☐☐☐
Other Component	☐☐☐	Other Component	☐☐☐	Other Component	☐☐☐
Other Component	☐☐☐	Other Component	☐☐☐	Other Component	☐☐☐

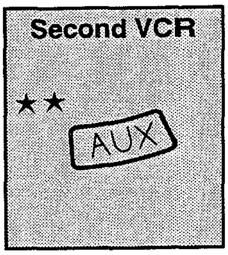
VCR Infrared Codes Index (For CT–32G22V/CV/UV)

The Universal Infrared Remote Control is capable of operating many brands of VCRs. Refer to the Programming the Remote Control section for procedures.

Note: The Universal Remote Control memory is limited; therefore, some models of VCRs may not operate. The Universal Remote Control is not designed to control all features that are available in all models.

Note: After entering the proper infrared code, press the Remote **VCR** (*) Selection Mode button. **A second VCR can be activated** using the same codes, from **AUX** (**) Selection Mode button. Then refer to the Remote Control Key Functions section, for Remote VCR and VCR 2 function key listing.





Code Index for VCRs

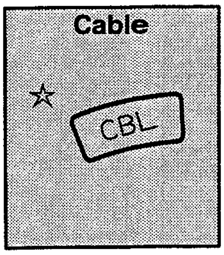
VCR Brand	Code(s)
Admiral	200
Aiwa	137, 160
Akai	014, 015, 016, 142
Audio Dynamic	011, 240
Bell & Howell	005, 013
Broksonic	081, 136
Canon	125, 135
Citizen	006
Craig	005, 006, 141
Curtis Mathes	130, 137, 300
Daewoo	001, 130, 250
DBX	010, 011, 240
Dimensia	300
Emerson	003, 051, 080, 081, 135, 136, 243, 250
Fisher	005, 007, 008, 009
Funai	081, 136, 137
GE	130, 170, 300
Goldstar	006
Go Video	220
Hitachi	000, 125, 300,
Instant Replay	125, 130,
Jensen	240
JVC	010, 011, 190, 240
Kenwood	006, 010, 011, 240
LXI	000, 005, 006, 007, 008, 009, 137
Magnavox	025, 130, 150
Marantz	010, 011, 240
Marta	006
Memorex	009, 130
MGA	230, 241, 242, 243, 330, 340
Minolta	000, 300
Mitsubishi	230, 241, 242, 243, 330, 340
Multitech	004, 137, 330
NEC	010, 011, 190, 240
Olympic	125, 130
Optimus	006, 200, 100, 140
Orion	081, 136
Panasonic	100, 101, 125, 130
Penney	000, 005, 010, 011, 130, 240, 300
Pentax	000, 011, 300
Philco	081, 125, 130, 136, 137, 150
Philips	125, 130, 150
Pioneer	125
Proscan	000, 001, 002, 125, 130, 150, 300, 310
Quasar	100, 101, 125, 130
Radio Shack	005, 009, 130, 137, 170, 210, 241
RCA	000, 001, 002, 125, 130, 150, 170, 300, 310
Realistic	005, 009, 130, 137, 210, 241
Samsung	002, 004, 220
Sansui	081, 136, 240
Sanyo	005, 009
Scott	001, 002, 004, 009, 081, 136, 230, 241, 330, 340
Sears	000, 005, 006, 007, 008,
Shaintom	050
Sharp	200, 210
Signature 2000	137, 200
Singer	050
Sony	140, 141, 142
SV2000	137
Sylvania	125, 130, 137, 150
Symphonic	137
Tashiro	006
Tatung	010, 011, 240
Teac	010, 011, 137, 240
Technics	100, 101, 125, 130
Teknika	130, 137
Toshiba	001, 310
Vector Research	011
Wards	006, 009, 200, 210, 290
Yamaha	005, 010, 011, 240
Zenith	290

Cable Converter Box and CD Players Infrared Codes Index (For CT–32G22V/CV/UV)

The Universal Infrared Remote Control is capable of operating many brands of Cable Converter Boxes and CD Players. Refer to the Programming the Remote Control section for procedures.

Note: The Universal Remote Control memory is limited; therefore, some models of Cable Converter Boxes and CD Players may not operate. The Universal Remote Control is not designed to control all features that are available in all models.

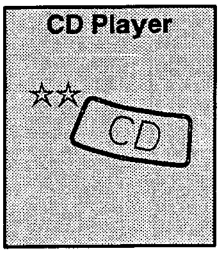
Note: After entering the proper infrared code, press the Remote **CBL** Selection Mode button (☆). Then refer to the Remote Control Key Functions section, for Remote CBL function key listing.



Codes for Cable Converter Box

Brand of Cable–TV Box	Code(s)
ABC	530
Archer	531, 544
Cableview	005, 544
Citizen	005, 522
Curtis	130, 131
Diamond	530, 531, 544
Eagle	541
Eastern	560
Gcbrand	005, 544
Gemini	522
General Instrument	122, 360, 520, 521, 522, 530, 531, 532, 533
Hamlin	130, 350, 720, 730, 731, 900
Hitachi	003, 530
Jerrold	122, 360, 520, 521, 522, 530, 531, 532, 533
Macom	003, 004, 005
Memorex	542
Movietime	005, 544
Oak	002, 702, 710
Panasonic	120, 121, 132
Paragon	281
Philips	006, 007, 540, 541, 542
Pioneer	001, 260
Pulsar	005, 544
Puser	544
RCA	170, 220
Realistic	544
Regal	130, 350, 720, 730, 731, 900
Regency	560
Rembrandt	005, 544, 702
Samsung	005
Scientific Atlanta	122, 130, 131
Slmark	001, 005
Sprucer	005, 121
Stargate	005, 544
Teleview	001, 005
Texscan	810
Tocom	700, 701
Toshiba	004
Unika	531, 544
Universal	522, 544
Videoway	006
Viewstar	541, 542
Zenith	000, 280, 281
Zenith/Drake Satellite	000

Note: After entering the proper infrared code, press the Remote **CD** Selection Mode button (☆☆). Then refer to the Remote Control Key Functions section, for Remote CD Players function key listing.



Codes for CD Players

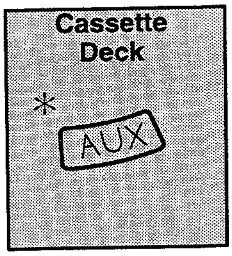
Brand of CD Players	Code(s)
Admiral	110
Aiwa	162, 164
Carver	150, 151
Denon	200
Emerson	172
Fisher	005
Garrard	057
Harman/Kardon	059, 060
Hitachi	007
Jensen	163
JVC	190, 191, 270
Kardon	058
Kenwood	000, 001, 050, 270
LXI	165
Magnavox	150, 161
Marantz	151
McIntosh	060
Nakamichi	032
Onkyo	053, 054
Optimus	030, 057, 059, 061
Panasonic	100, 101, 130
Philips	150, 151
Pioneer	030
Quasar	100, 101, 130
RCA	160, 170, 171, 500
Sansui	032, 050, 320
Sanyo	005
Scott	032, 050, 320
Sharp	200, 201
Sherwood	059
Sony	140
Soundesigh	220
Teac	051, 055, 057
Technics	100, 101, 130
Victor	190, 191, 270
Yamaha	002, 003, 004

Cassette Deck, Receivers, and Amplifiers Infrared Codes Index (For CT-32G22V/CV/UV)

The Universal Infrared Remote Control is capable of operating many brands of Cassette Deck, Receivers, or Amplifiers. Refer to the Programming the Remote Control section for procedures.

Note: The Universal Remote Control memory is limited; therefore, some models of Cassette Deck, Receivers, and Amplifiers may not operate. The Universal Remote Control is not designed to control all features that are available in all models.

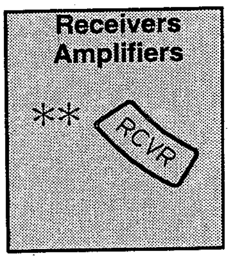
Note: After entering the proper infrared code, press the Remote **AUX** Selection Mode button (✳). Then refer to the Remote Control Key Functions section, for Remote Cassette Deck function key listing.



Code Index for Cassette Deck

Brand of Cassette Deck	Code(s)	Brand of Cassette Deck	Code(s)
Aiwa	760, 761, 762	Philips	751
Denon	800	Pioneer	630
Fisher	603	RCA	763, 770, 771
Jensen	657	Sansui	631, 653
JVC	780, 781	Sharp	800
Kenwood	600, 650	Sony	740
Marantz	751	Teac	653, 654
Nakamichi	631	Technics	700, 701, 730
Onkyo	651, 652, 656	Yamaha	601, 602
Panasonic	700, 701, 730		

Note: After entering the proper infrared code, press the Remote **RCVR** Selection Mode button (✳✳). Then refer to the Remote Control Key Functions section, for Remote Receivers/Amplifiers function key listing.



Code Index for Receivers and Amplifiers

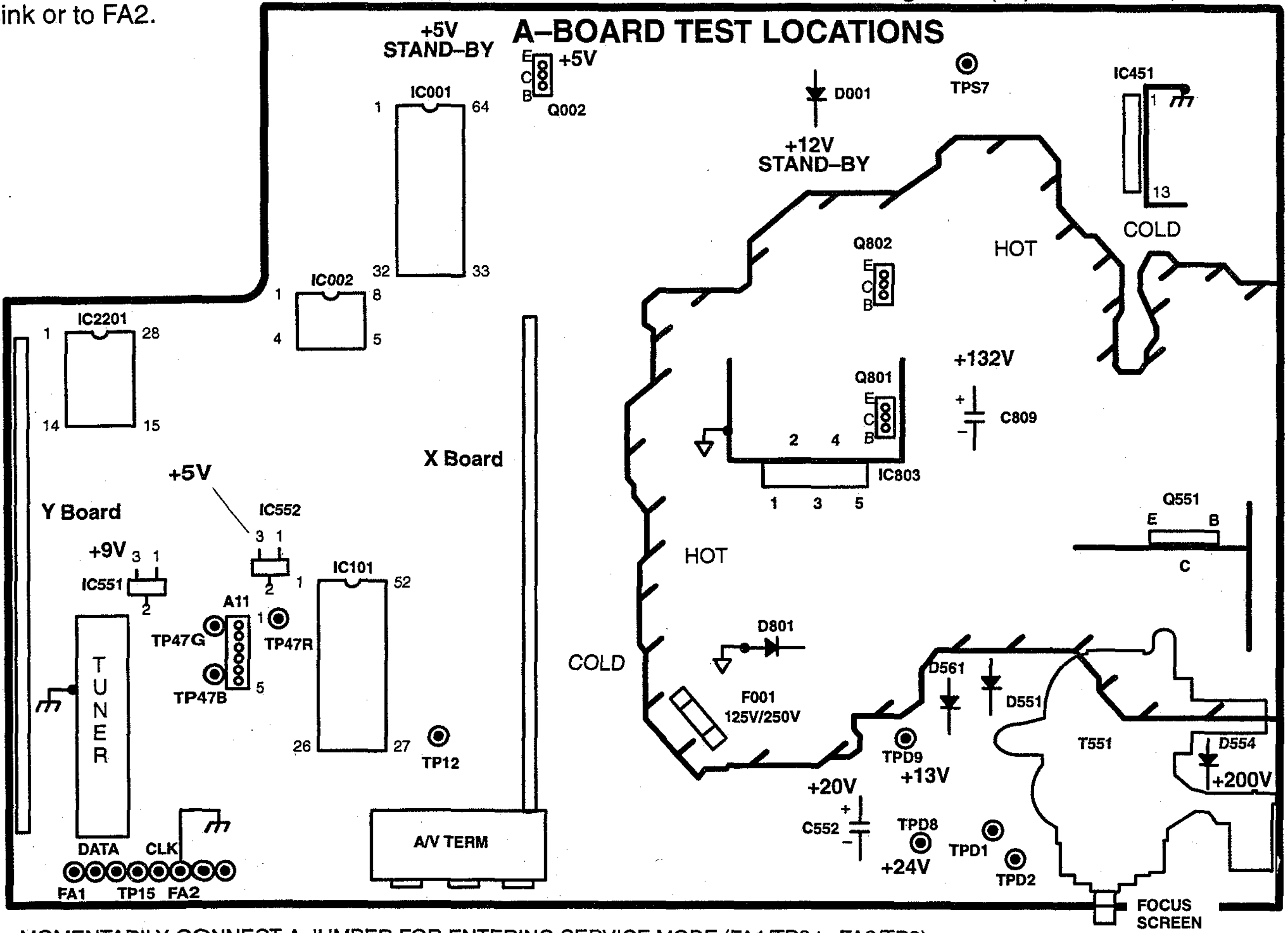
Brand of Receiver / Amplifier	Code(s)	Brand of Receiver / Amplifier	Code(s)
Admiral	110	Panasonic	100, 101, 130
Aiwa	160, 161	Philips	150
Denon	200, 201, 202	Pioneer	030, 032
Fisher	004	Quasar	100, 101, 130
Garrard	055	RCA	003, 130, 162, 170, 171
Harman	150, 057	Sansui	003, 053, 320
Jensen	164	Sharp	200, 203
JVC	190, 191	Sony	140
Kenwood	000, 050	Soundesign	220
Magnavox	162	Teac	053, 054, 055
Marantz	151	Technics	100, 101, 130
McIntosh	058	Victor	190, 191
Nakamichi	031	Yamaha	001, 002
Onkyo	151, 156		
Optimus	003, 162, 170, 171		

Notes

Chassis Service Adjustment Procedures

All service adjustments are factory preset and should not require adjustments unless controls and/or associated components are replaced.

NOTE: Connect the (–) lead of the voltmeter to the appropriate ground for the circuit being checked. When necessary to use a line operated ground, the ground indication (▽) is marked. For this ground use anode of D801 or IC803 heat sink. For all other circuits, connect the (–) lead of the voltmeter to the line isolated ground (⏚) tuner shield, IC451 heat sink or to FA2.


A-BOARD TEST LOCATIONS
+5V STAND-BY
+5V
E C B
Q002
IC001
1
64
32
33
IC002
1
8
4
5
D001
+12V STAND-BY
TPS7
IC451
1
13
COLD
HOT
Q802
E C B
Q801
+132V
C809
2
4
IC803
1
3
5
Q551
E
B
C
IC2201
1
28
14
15
+5V
X Board
Y Board
IC552
3 1
2
+9V 3 1
IC551
2
IC101
1
52
26
27
A11
1
5
TP47G
TP47R
TP47B
TP12
TUNER
HOT
COLD
D801
F001 125V/250V
D561
D551
T551
D554
+200V
TPD9
+13V
+20V
C552
TPD8
TPD1
+24V
TPD2
A/V TERM
DATA
CLK
FA1
TP15
FA2
FOCUS
SCREEN

MOMENTARILY CONNECT A JUMPER FOR ENTERING SERVICE MODE (FA1/TP8 to FA2/TP3)

131.0V B+ Voltage Confirmation

1. Set the **Bright** and the **Picture** to Minimum by using the Picture Menu.
2. Connect a DVM between C809, + side and Hot ground (▽).
3. Confirm that B+ voltage is 132.0V±2.5V. This voltage supplies B+ to the Horizontal Output & Flyback circuits.

Source Voltage Chart

120V AC line input. Set the **Bright** and the **Picture** to Minimum by using the Picture Menu . Use cold ground (⏚) for the (–) lead of the DVM.

IC551 pin 3	+9.0V ±0.5V
Cathode of D551 (TPD9)	+13.0V ±2V
C552 (+ side)	+20.0V ±2V
Cathode of D561 (TPD8)	+27.4V ±2V
Cathode of D554	+220V ±15V

Adjust Picture menu for normalized video adjustments.

B+ 5V Source Voltages

Volatile 5V:

C572, + side = IC552 pin 3, Tuner BP, IC101 (B+ V_{CC}).

MPU 5V:

Emitter Q002 = IC001(V_{DD}).

Standby 5V:

IC001 (Key in 1), I²C EEPROM (IC002), TIMER LED, Remote Receiver.

B+ 9V Source Voltage

IC551 pin 3 = IC101 (B+ V_{cc}), Tuner (BM).

B+ 12V (Stand–by) Note: +16V when power is on

Cathode D001 = RL801 (on–off relay), Q002 (+5V Reg).

High Voltage Check

1. Select an active TV channel and confirm that horizontal is in sync.
2. Adjust Brightness and Picture using Picture Icon menu so video just disappears.
3. Confirm B+ 132V is within limit.
4. Using a high voltage meter confirm that the High Voltage is 29.25kV ±1.25kV

Disassembly for Service

Back Cover

Remove all the screws marked with an arrow (⬅) from the back of the Receiver.

Note: screw configuration and number of screws may vary depending on the model of the Receiver serviced; various models are covered in this Manual.

1. 3 screws at the top edge of the Receiver.
2. 1 screw on the retainer plate for the AC power cord.
3. 1 screw by flyback assembly.
4. 2 screws by the A/V jacks.
5. 2 screws at the bottom edge of the Receiver.

A–Board – Main Chassis

1. Press tab on left rail.
2. Slide the chassis completely out of the guide rails. **NOTE:** Some tie–wraps that secure the wire dressings may need to be unfastened for chassis removal.
3. Stand the Receiver on its edge. The underside of the board is completely accessible for component replacement.

C–Board – CRT Output

Plugs into the socket on the CRT neck.

X–Board – Comb Filter, A/V Jacks, Video Switching

Connected to the Main Chassis (A–Board). It is the board located close to the center of the A–Board. The X–Board is connected to the A–Board with 2 or 3 connectors. Pull on the X–Board, perpendicular to the A–Board, while releasing the snap tabs on connectors A1, A2 and A3 (some models).

Y–Board – PIP Processing (CT–32G22)

Connected to the Main Chassis (A–Board). It is the board located close to the left edge of the A–Board. The Y–Board is connected to the A–Board with 2 connectors. Pull on the Y–Board, perpendicular to the A–Board, while releasing the snap tabs on connectors A31 & A32.

Keyboard Push Button Assembly

Fastened to the inside of the cabinet front by 3 screws.

Speakers

Secured to the cabinet by 2 screws each.

Disassembly for CRT Replacement

1. Discharge the CRT as instructed in the **Safety Precautions.**
2. Disconnect the yoke plug ,degaussing coil plug and the CRT 2nd anode button from the main board .
3. Remove the C–Board from the CRT base and unplug the black wire (CRT dag ground) C10–1 from the board.
4. Disconnect the A12 and SP plugs from the A–Board.
5. Slide the main chassis assembly completely out with the CRT Board attached.

CRT Replacement

1. Perform **Disassembly for CRT Replacement** procedure.
2. Insure that the CRT H.V. anode button is discharged before handling the CRT. See the **Safety Precautions** on handling the picture tube.
3. Remove the components from the CRT neck and place the cabinet face down on a soft pad.
4. Note the original order of the CRT mounting hardware as they are removed from the CRT mounting brackets at each corner of the CRT.
5. Remove the CRT with the degaussing coil and the dag ground braid attached.
6. Note the original locations and mounting of the degaussing coil and the dag ground assembly to insure proper reinstallation on the replacement CRT.

   To remove and re–mount the degaussing coil:
   The degaussing coil is held in place by clampers fastened to the CRT corner ears.
   These clampers must be installed onto the replacement CRT prior to mounting the degaussing coil.

   To remove and re–mount the dag ground braid:
   - Unhook the coil spring from the upper right CRT ear.
   - Release the braid loop from the upper left and the lower right CRT ear.
7. Mount the dag ground braid on the replacement CRT. Position the degaussing coil with new ties. Dress coil as was on the original CRT.
8. Replace the components on the CRT neck and re–install into cabinet. Verify that all ground wires and circuit board plugs get connected.

Purity and Convergence Procedure

Adjustment is necessary only if the CRT or the deflection yoke is replaced or if the setting was disturbed. The complete procedure consists of:

1. Initial static convergence.
2. Setting the purity.
3. Final static convergence.

When the CRT or the Yoke is Replaced

Place the yoke on the CRT neck (do not tighten the clamp).

For a 2–piece assembly (see Figure 7):

Position purity/convergence assembly as shown and tighten clamp snugly. Cut the hot–melt glue seal on assembly and place like tabs of purity device together at 12 o'clock to reduce its magnetic field effect. Manually degauss the CRT.

Turn the Receiver ON and slide the deflection yoke back and forth on the neck of the CRT. Stop at the position that produces a near white, uniform raster.

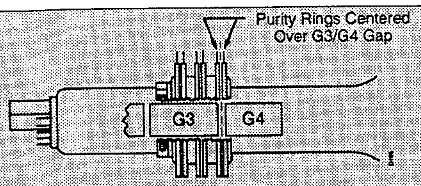


Figure 7. **Positioning of Purity/Convergence Assembly (2–piece assembly)**

For a 1–piece assembly (see Figure 8):

Place like tabs of purity devices together at 12 O'Clock to reduce any magnetic field effect. Manually degauss the set.

Connect a Black/White pattern generator and tune the receiver to the signal. Slide the deflection yoke & purity ring assembly back and forth on the CRT neck. Stop at a position that produces a near white signal.

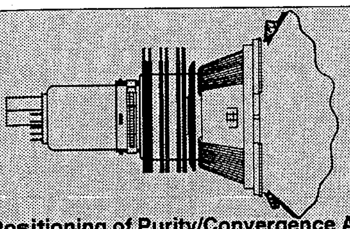


Figure 8. **Positioning of Purity/Convergence Assembly (1–piece assembly)**

Initial Center Static Convergence

Connect a dot/crosshatch generator to the Receiver and tune in signal. Observe misconvergence at center of the screen only.

Adjust the 4 pole magnet (center rings); separate tabs and rotate to converge blue with red.

Adjust the 6 pole magnet (rear rings): separate tabs and rotate to converge blue and red (magenta) with green. ***Note:*** *Precise convergence at this point is not important.*

Purity Adjustment

When the Receiver is in the Serviceman Mode for making electronic adjustments, press the **Recall** button on the Remote Control to enter Purity Check. (See **Service Adjustments Electronic Controls.**)

Operate the Receiver for 60 minutes using the first Purity check field (white screen) to stabilize the CRT.

Fully degauss the Receiver by using an external degaussing coil.

Press the **Recall** button on the Remote Control again until the Purity Check (green screen) appears.

For a 2–piece assembly (see Figure 7):

Loosen the deflection yoke clamp screw and move the deflection yoke back as close to the purity magnet as possible.

Adjust the purity rings to set the vertical green raster precisely at the center of the screen (see Figure 9).

NOTES:

1. CRT warm up with white screen (three guns activated) is needed to stabilize the shadow mask expansion.
2. Initial center static convergence (roughly centers three gun beams) is required in order to perform purity adjustment.

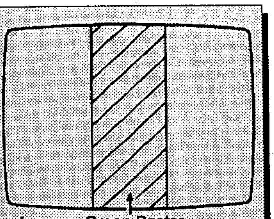


Figure 9. **Green Raster Adjustment**

Slowly move the deflection yoke forward until the best overall green screen is displayed.

For a 1–piece assembly (see Figure 8):

Slowly move the deflection yoke and purity rings assembly toward the CRT board and adjust the purity magnet rings to set vertical green raster at center of screen (see Figure 9).

Gradually move the deflection yoke & purity rings forward and adjust for the best overall green screen.

Continue from here for either assemblies:

Tighten the deflection yoke clamp screw.

Press the **Recall** button on the Remote Control again until the Purity Check (blue screen) and (red screen) appear and observe that good purity is obtained on each respective field.

Press the **Recall** button on the Remote Control again until Purity check (white screen) appears. Observe the screen for uniform white. If purity has not been achieved, repeat the above procedure.

Final Convergence Procedure (see Figure 10 through Figure 12):

Note: *Vertical size and focus adjustments must be completed prior to performing the convergence adjustment. Connect a dot pattern generator to the Receiver. The* ***Brightness*** *level should not be higher than necessary to obtain a clear pattern.*

Converge the red and blue dots at the center of the screen by rotating the 4 pole (R with B) Static Convergence Magnets.

Align the converged red/blue dots with the green dots at the center of the screen by rotating the 6 pole (R/B with G) Static Convergence Magnets. Melt wax with soldering iron to reseal the magnets.

Slightly tilt vertically and horizontally (do not rotate) the deflection yoke to obtain a good overall convergence.

If convergence is not reached at the edges, insert permalloy (see following section) from the DY corners to achieve proper convergence. Recheck for purity and readjust if necessary.

After vertical adjustment of the yoke, insert wedge at 6 o'clock position, then make the horizontal tilt adjustment.

Secure the deflection yoke by inserting two side wedges at 2 and 10 o'clock positions.

Apply adhesive between tab (thin portion) of wedge and CRT and place tape over the tab to secure to the CRT.

Permalloy Convergence Corrector Strip (Part No. 0FMK014ZZ)

This strip is used in some sets to match the yoke and CRT for optimum convergence. If the yoke or CRT is replaced, the strip may not be required.

First converge the set without the strip and observe the corners.

If correction is needed:

1. Place strip between CRT and yoke, in quadrant needing correction. Slowly move it around for desired results.
2. Press adhesive tightly to the CRT and secure with tape.

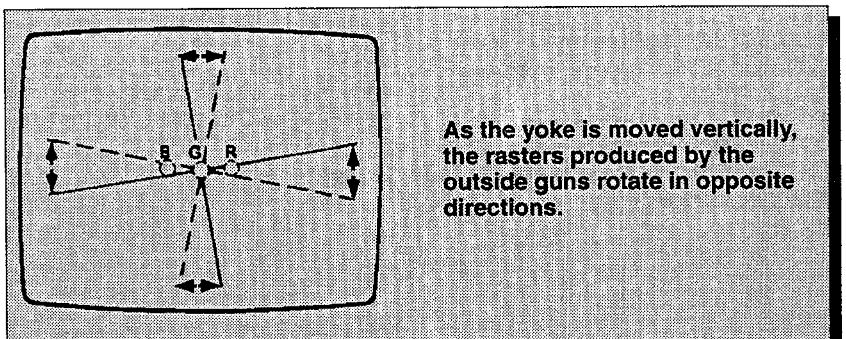

B
G
R
As the yoke is moved vertically, the rasters produced by the outside guns rotate in opposite directions.

Figure 10. **Vertical Yoke Movement**

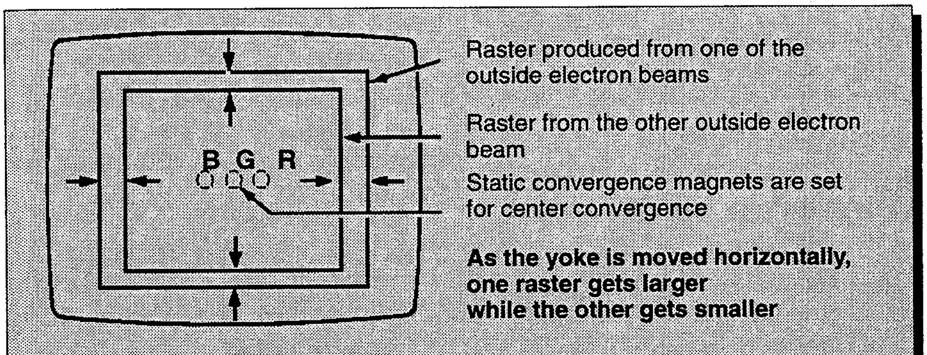

Raster produced from one of the outside electron beams
Raster from the other outside electron beam
B G R
Static convergence magnets are set for center convergence
As the yoke is moved horizontally, one raster gets larger while the other gets smaller

Figure 11. **Horizontal Yoke Movement**

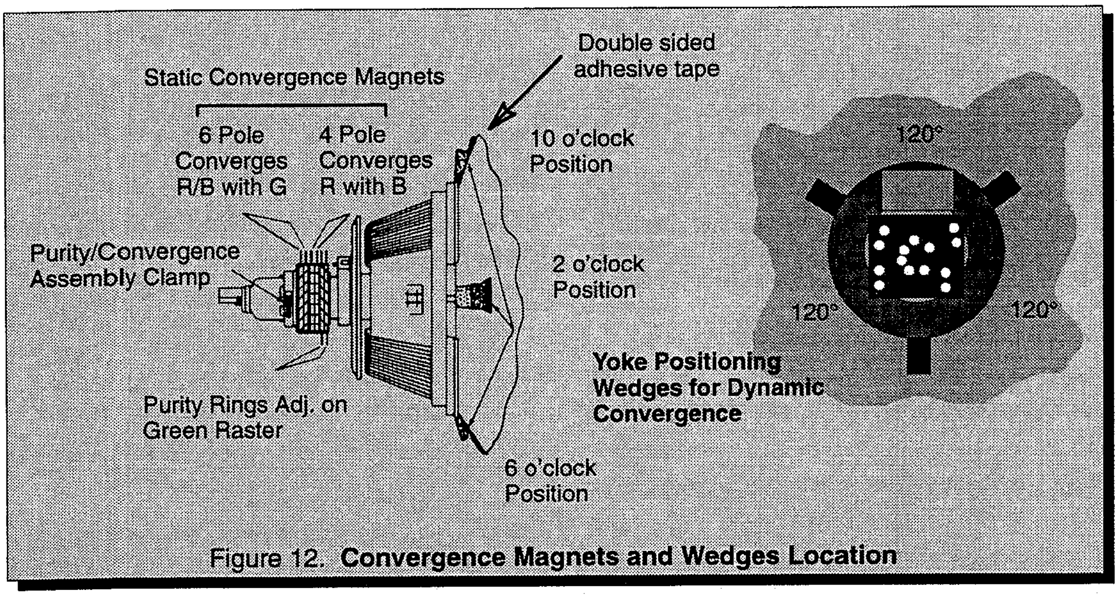
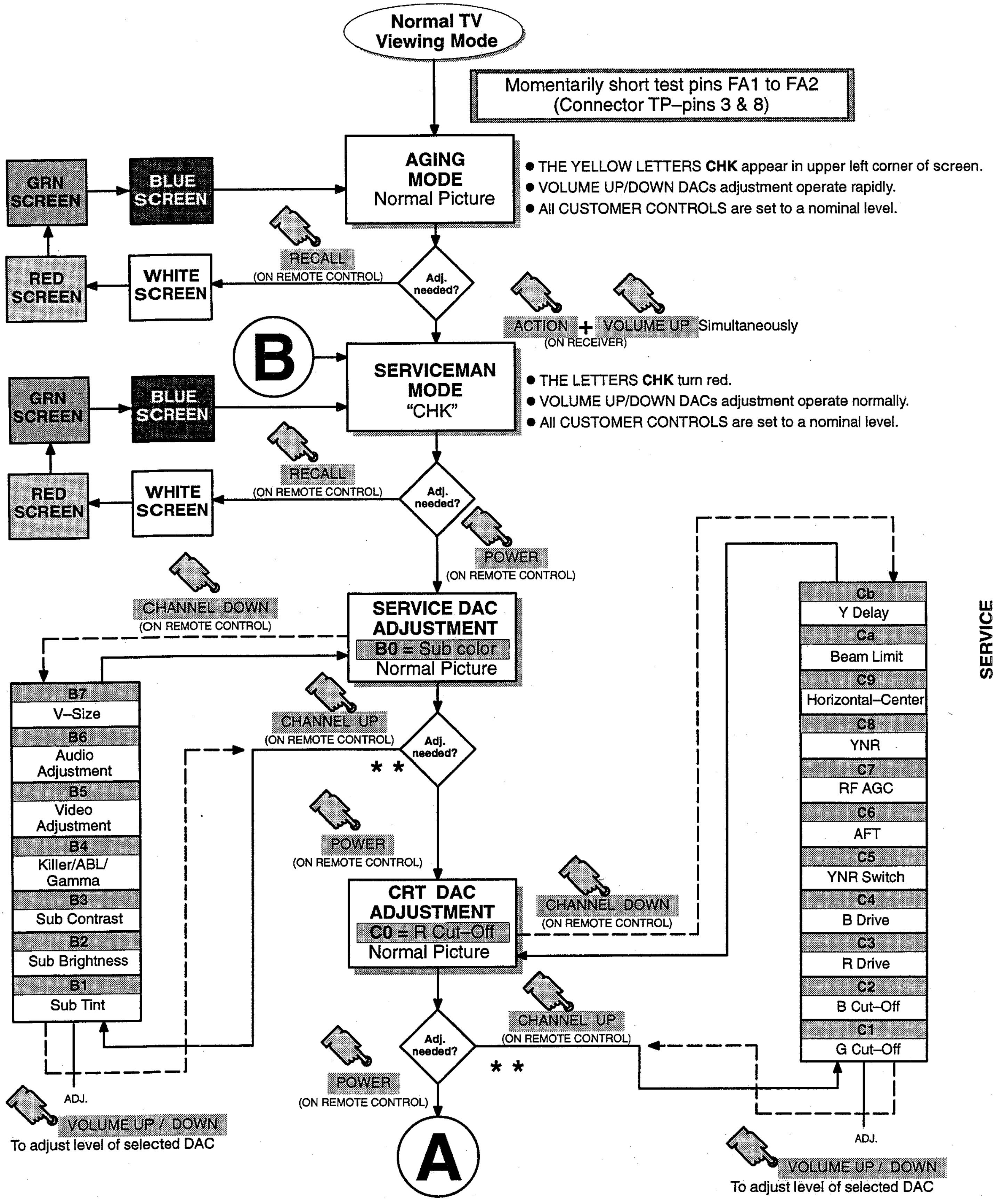

Static Convergence Magnets
6 Pole Converges R/B with G
4 Pole Converges R with B
Double sided adhesive tape
10 o'clock Position
Purity/Convergence Assembly Clamp
2 o'clock Position
Purity Rings Adj. on Green Raster
6 o'clock Position
Yoke Positioning Wedges for Dynamic Convergence
120°
120°
120°

Figure 12. **Convergence Magnets and Wedges Location**

Instructional Flow Chart for Serviceman Mode

Caution: Always EXIT Serviceman Mode


Normal TV Viewing Mode
Momentarily short test pins FA1 to FA2 (Connector TP–pins 3 & 8)
AGING MODE
Normal Picture
GRN SCREEN
BLUE SCREEN
RED SCREEN
WHITE SCREEN
RECALL
(ON REMOTE CONTROL)
Adj. needed?
ACTION + VOLUME UP Simultaneously
(ON RECEIVER)
B
SERVICEMAN MODE
"CHK"
GRN SCREEN
BLUE SCREEN
RED SCREEN
WHITE SCREEN
RECALL
(ON REMOTE CONTROL)
Adj. needed?
POWER
(ON REMOTE CONTROL)
CHANNEL DOWN
(ON REMOTE CONTROL)
SERVICE DAC ADJUSTMENT
B0 = Sub color
Normal Picture
B7
V–Size
B6
Audio Adjustment
B5
Video Adjustment
B4
Killer/ABL/ Gamma
B3
Sub Contrast
B2
Sub Brightness
B1
Sub Tint
CHANNEL UP
(ON REMOTE CONTROL)
Adj. needed?
* *
POWER
(ON REMOTE CONTROL)
CRT DAC ADJUSTMENT
C0 = R Cut–Off
Normal Picture
CHANNEL DOWN
(ON REMOTE CONTROL)
Cb
Y Delay
Ca
Beam Limit
C9
Horizontal–Center
C8
YNR
C7
RF AGC
C6
AFT
C5
YNR Switch
C4
B Drive
C3
R Drive
C2
B Cut–Off
C1
G Cut–Off
CHANNEL UP
(ON REMOTE CONTROL)
Adj. needed?
* *
POWER
(ON REMOTE CONTROL)
A
ADJ.
VOLUME UP / DOWN
ADJ.
VOLUME UP / DOWN

- THE YELLOW LETTERS **CHK** appear in upper left corner of screen.
- VOLUME UP/DOWN DACs adjustment operate rapidly.
- All CUSTOMER CONTROLS are set to a nominal level.

- THE LETTERS **CHK** turn red.
- VOLUME UP/DOWN DACs adjustment operate normally.
- All CUSTOMER CONTROLS are set to a nominal level.

To adjust level of selected DAC

To adjust level of selected DAC

Figure 13. **Flow Chart for Serviceman Mode**

Instructional Flow Chart for Serviceman Mode – Continued

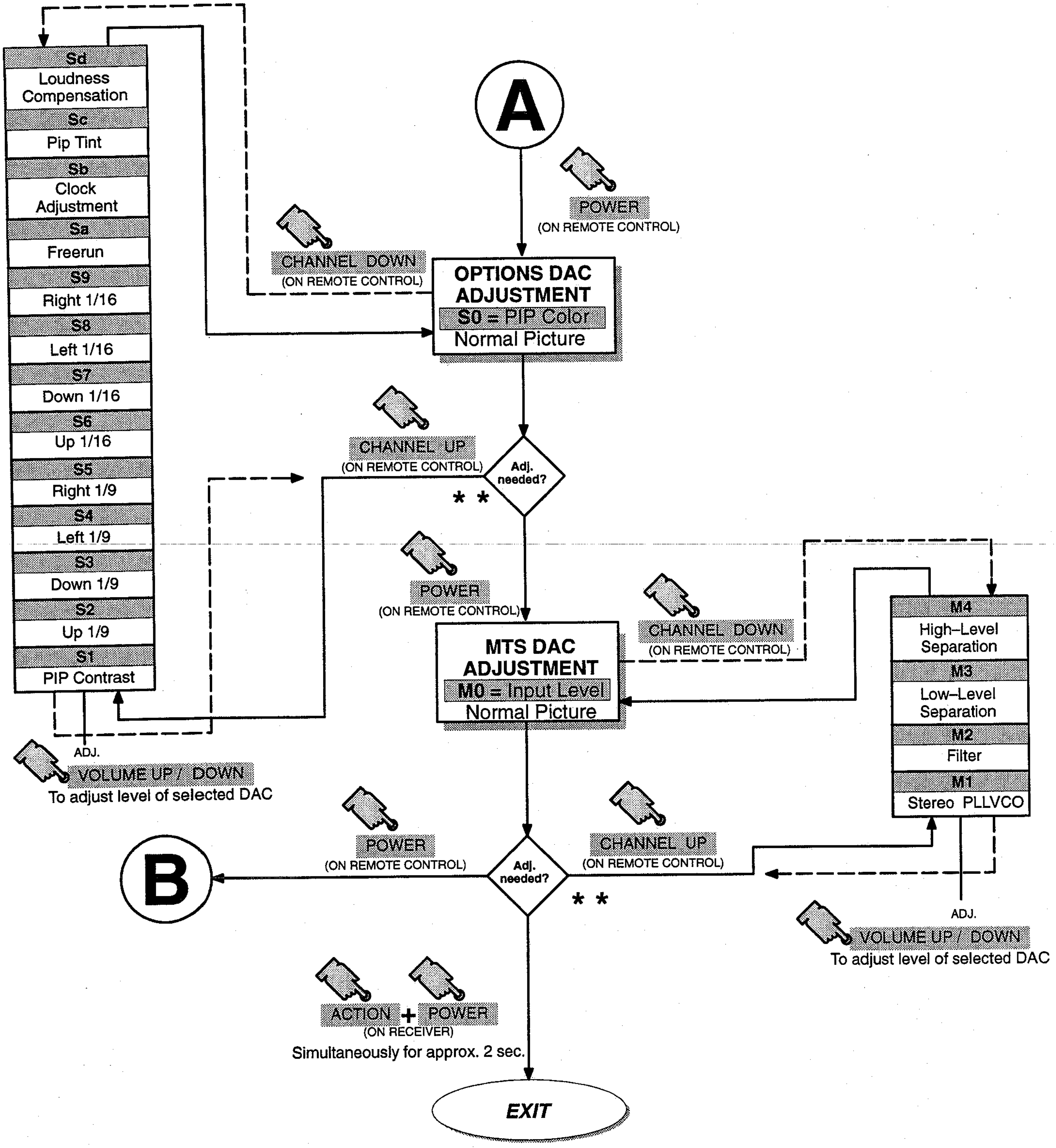

A
POWER
(ON REMOTE CONTROL)
CHANNEL DOWN
(ON REMOTE CONTROL)
OPTIONS DAC ADJUSTMENT
S0 = PIP Color
Normal Picture
Sd
Loudness Compensation
Sc
Pip Tint
Sb
Clock Adjustment
Sa
Freerun
S9
Right 1/16
S8
Left 1/16
S7
Down 1/16
S6
Up 1/16
S5
Right 1/9
S4
Left 1/9
S3
Down 1/9
S2
Up 1/9
S1
PIP Contrast
CHANNEL UP
(ON REMOTE CONTROL)
Adj. needed?
* *
POWER
(ON REMOTE CONTROL)
ADJ.
VOLUME UP / DOWN
To adjust level of selected DAC
MTS DAC ADJUSTMENT
M0 = Input Level
Normal Picture
CHANNEL DOWN
(ON REMOTE CONTROL)
M4
High–Level Separation
M3
Low–Level Separation
M2
Filter
M1
Stereo PLLVCO
POWER
(ON REMOTE CONTROL)
B
Adj. needed?
CHANNEL UP
(ON REMOTE CONTROL)
* *
ADJ.
VOLUME UP / DOWN
To adjust level of selected DAC
ACTION + POWER
(ON RECEIVER)
Simultaneously for approx. 2 sec.
EXIT

Figure 14. **Flow Chart for Serviceman Mode (Continued)**

Note: When *EXITING*, the Receiver shuts off; then turns on, TUNED TO CHANNEL 3 WITH A PRESET SOUND LEVEL.

Any Programmed Channels, Channels Caption data and some other user defined settings will be erased.

**** * Important Note***

Before making any DAC adjustments note the existing values!

Serviceman Mode (Electronic Controls)

This Receiver has electronic technology using the I^2C Bus Concept. It performs as a control function and it replaces many mechanical controls. Instead of adjusting mechanical controls individually, many of the control functions are now performed by using the "On Screen Display Menu". (The **Serviceman Adjustment Mode.**)

Note: *It is suggested that the technician reads all the way through and understand the following procedure for Entering/Exiting the* ***Serviceman Adjustment Mode****; then proceed with the instructions working with the Receiver. When becoming familiar with the procedure, the Flow Chart for Serviceman Mode may be used as a quick guide.*

Quick Entry To Serviceman Mode:

At times when minor adjustments need to be done to the electronic controls, the method of Entering the Serviceman Mode without removal of the cabinet back is as follows using the Remote Control:

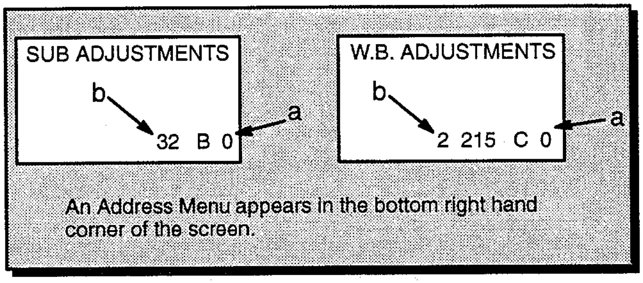
1. Select SET–UP icon and select CABLE mode.
2. Select TIMER Icon and set SLEEP timer for 30.
3. Press ACTION button twice to exit Menus.
   Tune to Channel 124.
   Adjust VOLUME to Minimum (0).
   On Receiver press the VOL ◄ button (decrease). Red "CHK" appears in upper corner.

To toggle between Aging and Serviceman modes:

While the "CHK" is displayed on the left top corner of the CRT, pressing the **Action** and the **Volume Down** buttons on the Receiver simultaneously will toggle between the modes.

4. **Press** the **Power** button on the Remote Control to select one of five Serviceman Adjustment Modes.
   1) B = Serviceman VCJ SUB ADJUSTMENTS
   2) C = Serviceman VCJ CUT–OFF ADJUSTMENTS
   3) S = Serviceman OPTIONS (PIP and CLOCK) ADJUSTMENTS
   4) M = Serviceman MTS ADJUSTMENTS
   5) "CHK" = Normal operation of CHANNEL ▲▼ and VOLUME ◄ ►

Note: Only the applicable settings for the Receiver serviced will be available (see a in Figure 15).



An Address Menu appears in the bottom right hand corner of the screen.

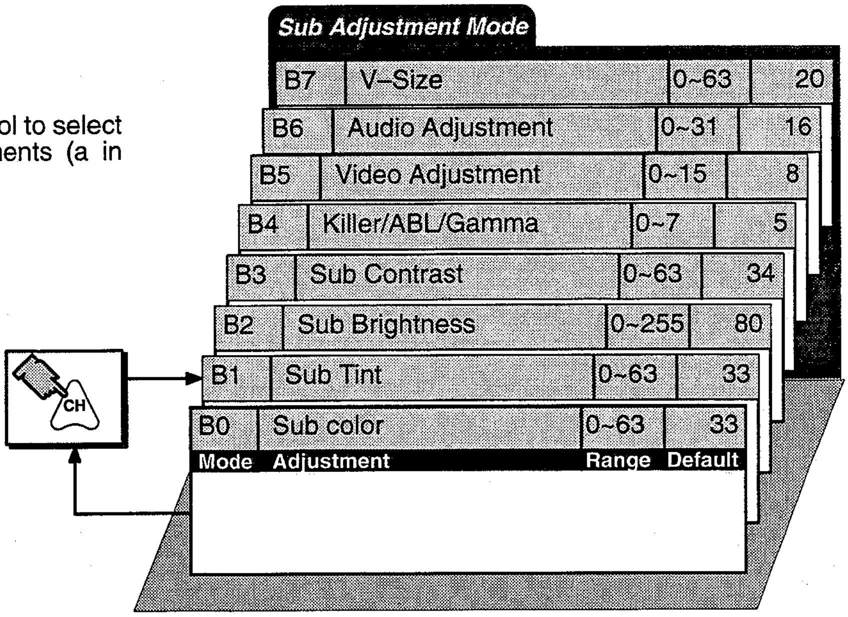
Figure 15. **Serviceman Mode Menu Adjustments**

For DAC Adjustments:

1. **Press Channel Up/Down** on the Remote Control to select one of the 8 available Service Adjustments (a in Figure 15).

   Important Note: *Write down the original value set (b in Figure 15) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

2. **Press Volume Up/Down** on the Remote Control to adjust the level of the selected Service Adjustment (b in Figure 15).



Mode	Adjustment	Range	Default
B7	V–Size	0~63	20
B6	Audio Adjustment	0~31	16
B5	Video Adjustment	0~15	8
B4	Killer/ABL/Gamma	0~7	5
B3	Sub Contrast	0~63	34
B2	Sub Brightness	0~255	80
B1	Sub Tint	0~63	33
B0	Sub color	0~63	33

Figure 16. **Sub Adjustment Mode**

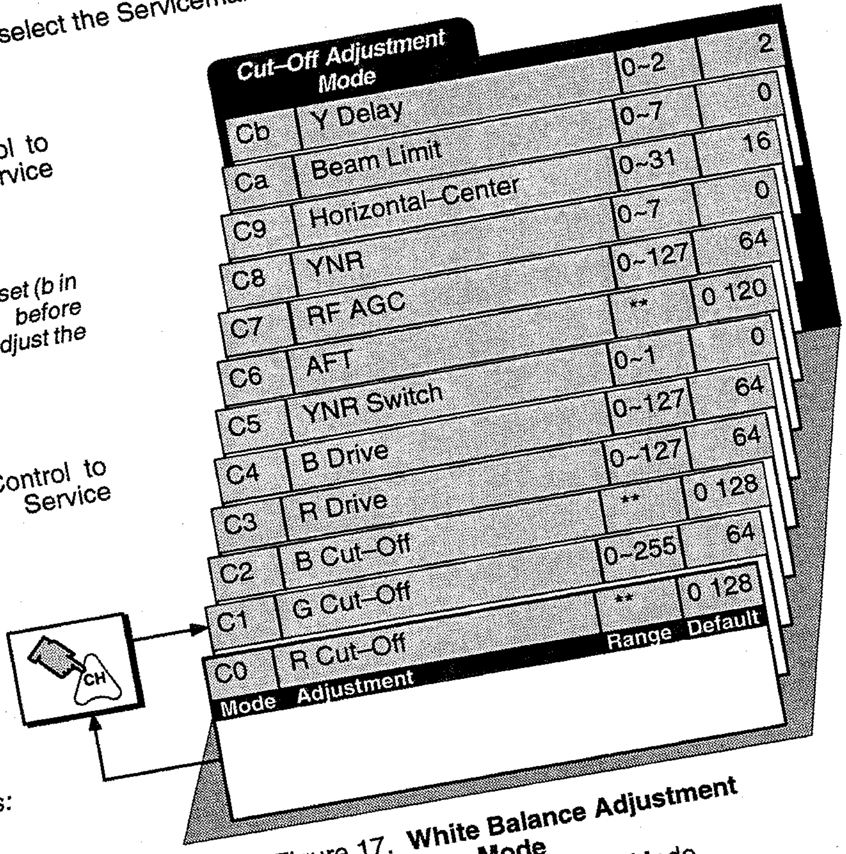
Press the **Power** button on the Remote Control to select the Serviceman White Balance Adjustment Mode.

For VCJ Cut–Off Adjustments:

1. **Press Channel Up/Down** on the Remote Control to select one of the 12 available Service Adjustments (a in Figure 15).

Important Note: Write down the original value set (b in Figure 15) for each address adjustment before modifying anything. It is easy to erroneously adjust the wrong item.

2. **Press Volume Up/Down** on the Remote Control to adjust the level of the selected Service Adjustment (b in Figure 15).



Mode	Adjustment	Range	Default
Cb	Y Delay	0~2	2
Ca	Beam Limit	0~7	0
C9	Horizontal–Center	0~31	16
C8	YNR	0~7	0
C7	RF AGC	0~127	64
C6	AFT	**	0 120
C5	YNR Switch	0~1	0
C4	B Drive	0~127	64
C3	R Drive	0~127	64
C2	B Cut–Off	**	0 128
C1	G Cut–Off	0~255	64
C0	R Cut–Off	**	0 128

** **Note:** *Range is in steps:*
0 0 ~ 0 255
1 0 ~ 1 255

Figure 17. **White Balance Adjustment Mode**

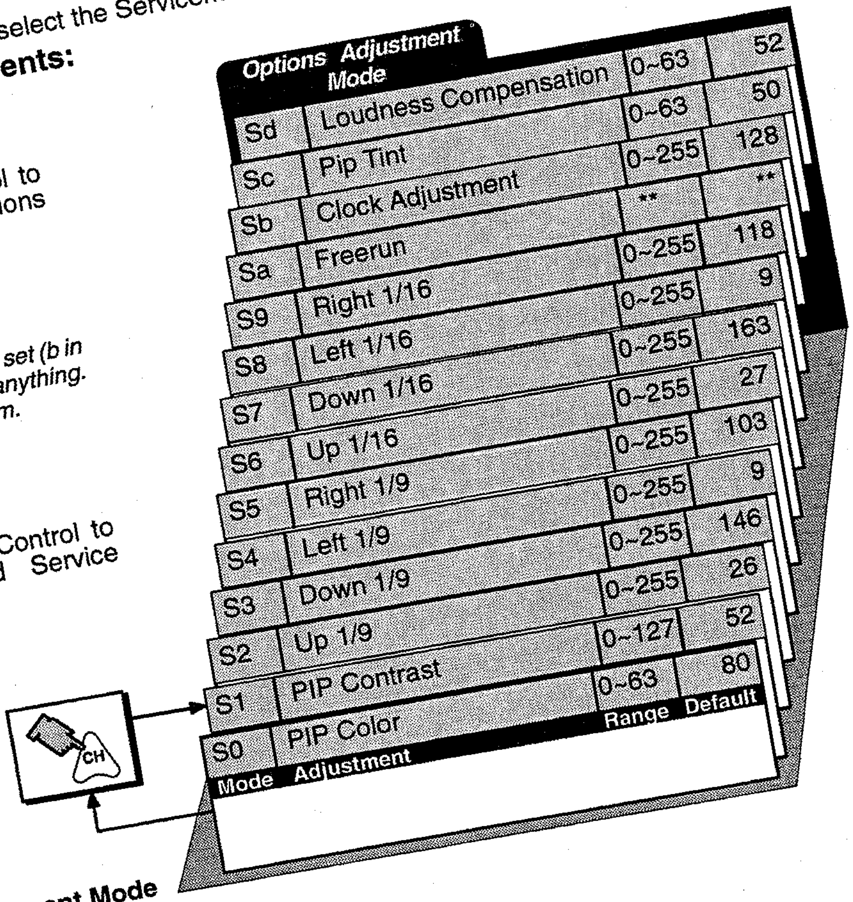
Press the **Power** button on the Remote Control to select the Serviceman MTS Adjustment Mode.

For Options (PIP and CLOCK) Adjustments:

1. **Press Channel Up/Down** on the Remote Control to select one of the 12 available Options Adjustments (a in Figure 15).

Important Note: Write down the original value set (b in Figure 15) for each address before modifying anything. It is easy to erroneously adjust the wrong item.

2. **Press Volume Up/Down** on the Remote Control to adjust the level of the selected Service Adjustment (b in Figure 15).



Mode	Adjustment	Range	Default
Sd	Loudness Compensation	0~63	52
Sc	Pip Tint	0~63	50
Sb	Clock Adjustment	0~255	128
Sa	Freerun	**	**
S9	Right 1/16	0~255	118
S8	Left 1/16	0~255	9
S7	Down 1/16	0~255	163
S6	Up 1/16	0~255	27
S5	Right 1/9	0~255	103
S4	Left 1/9	0~255	9
S3	Down 1/9	0~255	146
S2	Up 1/9	0~255	26
S1	PIP Contrast	0~127	52
S0	PIP Color	0~63	80

** *Set Freerun on during this item selected.*

Figure 18. **Options Adjustment Mode**

Press the **Power** button on the Remote Control to select the Serviceman MTS Adjustment Mode.

For MTS Adjustments:

1. **Press**
   Channel Up/Down on the Remote Control to select one of the 5 available MTS Adjustments (a in Figure 15).

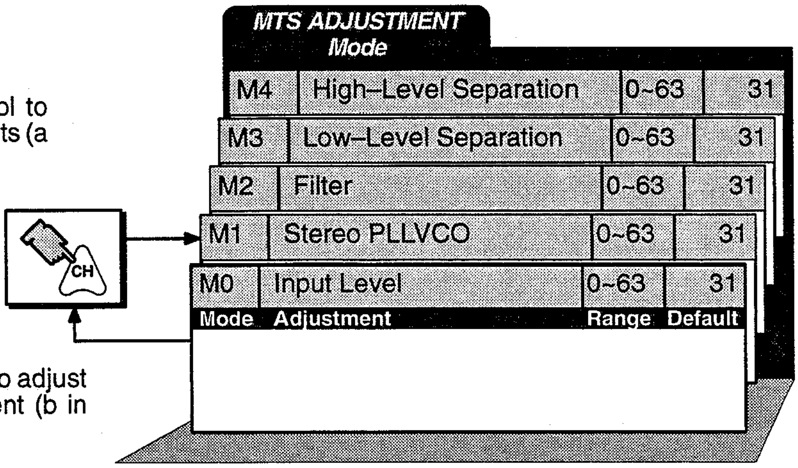
   Important Note: *Write down the original value set (b in Figure 15) for each address before modifying anything. It is easy to erroneously adjust the wrong item.*

2. **Press**
   Volume Up/Down on the Remote Control to adjust the level of the selected Service Adjustment (b in Figure 15).

3. Press the **POWER** button on the remote control to loop back to setting of the SUB ADJ Mode.

   OR

   Press **ACTION** and **POWER** buttons on the Receiver simultaneously for at least 2 seconds to return the Receiver to normal mode (exit Serviceman Mode).



Mode	Adjustment	Range	Default
M4	High–Level Separation	0~63	31
M3	Low–Level Separation	0~63	31
M2	Filter	0~63	31
M1	Stereo PLLVCO	0~63	31
M0	Input Level	0~63	31

Figure 19. **MTS Adjustment Mode**

To Check Purity:

Press the **Recall** button on the Remote Control when in Serviceman Modes (red "CHK" is displayed) to enter the Purity Field Check Mode.

Note: *The Receiver must be in the Serviceman Mode to display color.*

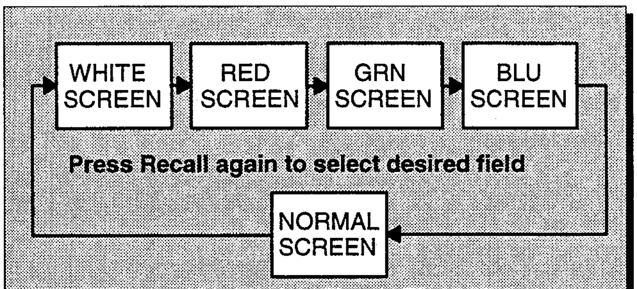


Figure 20. **Purity Check Field Mode**

IMPORTANT NOTE:
Always Exit the Serviceman Mode following Adjustments.

Exiting the Serviceman Mode:

Press the **Action** and the **Power** buttons on the Receiver simultaneously for at least 2 seconds.
"The Receiver exits Serviceman Mode".
The Receiver momentarily shuts off; then comes back on tuned to channel 3 with a preset level of sound.

Helpful Hints

Entering Serviceman Mode (Other Method – back open):

1. While the Receiver is ON and operating in Normal Mode, momentarily short test point FA1 to cold ground (⏚) FA2 (A–Board: TP pin 8 to pin 3).
   "The Receiver enters the Aging Mode".
   Yellow letters "CHK" appear in the upper left corner of the CRT.
   (The Volume Up/Down will adjust rapidly.)
2. Simultaneously **press** the **Action** and the **Volume Up** buttons on the Receiver Control Panel.
   "The Receiver enters the Serviceman's Mode".
   The letters in "CHK" turn red.
   (The Volume Up/Down will adjust normally.)
   (All customer controls are set to a nominal level.)

Service Adjustments (Electronic Controls)

Video Adjustment Level

Serviceman DAC Adjustment (B5)

Preparation:

1. Obtain an NTSC color bar pattern with 100 IRE white and 87.5% modulation.
2. Connect the oscilloscope to TP12. Use cold ground for scope connection. Set the scope at Horizontal Sweep rate (20µs) time base.

Procedure:

1. In the Serviceman Mode for making electronic adjustments, select DAC Video Adjustment Level (B5) and adjust for 1.0V ±0.05V from sync tip to white level. See Figure 21.

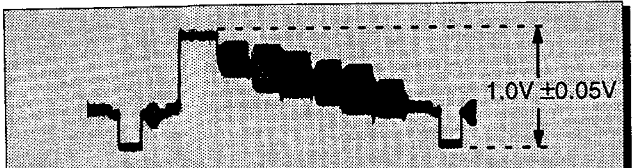


Figure 21. **TP12 waveform**

2. Set the DAC Sub–Contrast Adjustment (B3).

Sub–Contrast

Serviceman DAC Adjustment (B3)

This adjustment is factory set. **Do not adjust** unless repairs are made to associated circuits, the CRT Board, or when the CRT is replaced.

Preparation:

1. Apply a color bar signal pattern with 87.5% modulation, 70% saturated color bar with a 100 IRE white and 7.5 black.

NOTE: The pattern used in this procedure is an EIA color bar pattern with 87.5% modulation with 100 IRE white and 7.5 black. Correlate the information in this procedure to the pattern used if another signal is used.

2. Preset the following controls:
   - Brightness .... Center
   - Color .... Min
   - Picture .... Max.
   - Sharpness .... Center
3. Connect the oscilloscope to the CRT–Board connector C1–2. Set the scope time base to 20µs (horizontal).
4. Connect a jumper from TPD2 to ground (⏚)
5. Connect a jumper from IC101 pin 28 to ground (⏚).

Procedure:

1. In the Serviceman Mode for electronic adjustments, select DAC Sub–Brightness Adjustment (B2) and adjust for 1.0–1.5Vp–p between blanking and 7.5 IRE level so that the black level cannot be compressed. (see video waveforms detail, Figure 22).
2. In the Serviceman Mode for electronic adjustments, select DAC Sub–Contrast Adjustment (B3) and adjust for 2.8Vp–p ±0.1V from white level to black level on video waveform (see video waveforms detail, Figure 22).

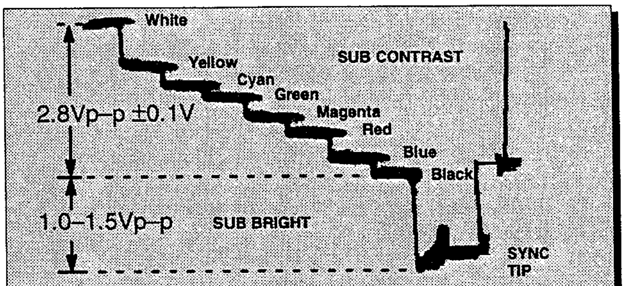


Figure 22. **TP35 waveform**

3. Remove the jumpers (Preparation steps 4 and 5).

Tint/Color Adjustment

Serviceman DAC Adjustment (B1) (B0)

Preparation:

1. Apply a rainbow color bar signal.
2. Preset the following controls:
   - Brightness .... Min.
   - Color .... Center
   - Picture .... Max.
   - Sharpness .... Min
   - Tint .... Center
3. Connect the oscilloscope to TP47B (A–Board) or to connector C1 pin 3.
4. Connect a jumper from TPD2 to GND (⏚).
5. Connect a jumper from IC101 pin 28 to ground (⏚).

Procedure:

1. In the Serviceman Mode for making electronic adjustments, select DAC Sub–Tint Adjustment (B1). Adjust until the waveform measured is as the one shown in Figure 23.

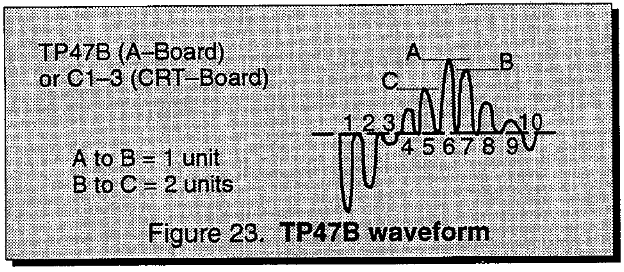


Figure 23. **TP47B waveform**

2. Connect the oscilloscope to TP47G (A–Board) or to connector C1 pin 2 (CRT–Board).
3. Select DAC Sub–Color Adjustment (B0) and adjust for peak to peak amplitude to be 0.9V p–p ±0.05V (Figure 24).

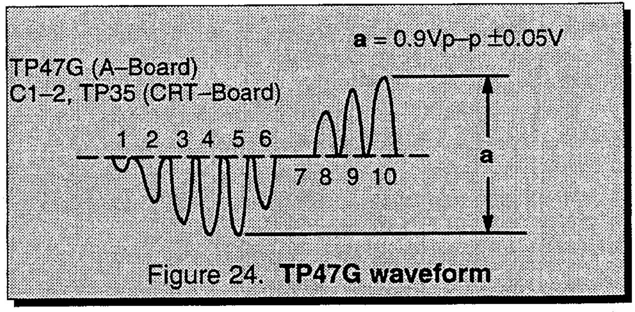


Figure 24. **TP47G waveform**

4. Remove the jumpers (Preparation steps 4 and 5).

Service Adjustments (Electronic Controls,cont.)

Color Temperature Adjustment (B/W Tracking)

Serviceman DAC Adjust. (C0) (C1) (C2) (C3) (C4)

Minor Touch–Up Method

OBSERVE low and high brightness areas of a B/W picture for proper tracking. Adjust only as required for "good grey scale and warm highlights".

1. LOW LIGHT areas – In Serviceman Mode for making electronic adjustments, select Cutoff (C0) RED, (C1) GRN, (C2) BLU and adjust the picture for grey.
2. HIGH LIGHT areas – In Serviceman Mode for making electronic adjustments, select Drive (C3) RED, (C4) BLU and adjust the picture for warm whites.

Complete Adjustment

Preparation:

1. Turn the Receiver "ON" and allow 10 minutes warm up at high brightness.
2. Apply a color bar signal with color "OFF".
3. Turn the SCREEN control (part of FBT T551) fully counterclockwise.

Procedure:

Preset the following Serviceman DAC's for the best results.

- C0 .... 0 128
- C1 64
- C2 .... 0 128
- C3 64
- C4 64

1. Connect the oscilloscope to C1–2 (CRT–Board).
2. In Serviceman Mode for making electronic adjustment, select the Sub–Bright DAC (B2).
3. Press the R–Tune key on the remote.
4. Observe the oscilloscope waveform at Horizontal rate and adjust the Serviceman Mode Sub–Bright DAC (B2) level until a scanning period of 3.0V above DC ground is measured, as indicated in Figure 25.

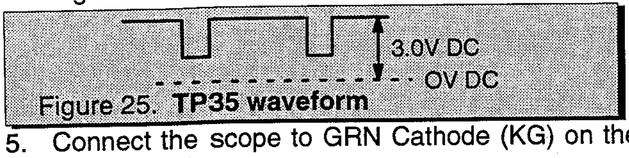


Figure 25. **TP35 waveform**

5. Connect the scope to GRN Cathode (KG) on the CRT–Board.
6. In the Serviceman Mode for making electronic adjustments, select the GREEN CUTOFF DAC (C1).
7. Press the R–Tune key on the remote.
8. View scope trace at Horizontal rate and adjust the Serviceman Mode DAC (C1) level until a scanning period of 195V above DC ground is measured, as indicated in Figure 26.

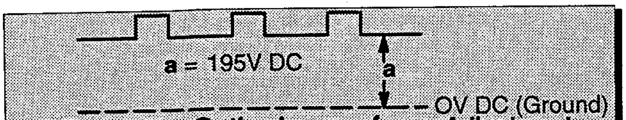


Figure 26. **Cathode waveform, Adjustment Waveform Detail (Steps 8, 12 & 16)**

9. Connect the scope to the RED Cathode (KR).
10. In Serviceman Mode for making electronic adjustments, select the RED CUTOFF DAC (C0).
11. Press the R–Tune key on the remote.
12. View the scope trace and adjust the Serviceman Mode DAC (C0) for the scanning period to be 195V above DC ground. (See Figure 26)
13. Connect the scope to the BLU Cathode (KB).
14. In Serviceman Mode for making electronic adjustments, select the BLU CUTOFF (C2).
15. Press the R–Tune key on the remote.
16. View the scope trace and adjust the Serviceman Mode DAC (C2) for the scanning period to be 195V above DC ground. (See Figure 26)
17. Turn the Screen Control (part of FBT) slowly clockwise until a color horizontal line appears.
18. With the other two colors Serviceman Mode DAC CUTOFF adjustments (C0) RED, (C1) GRN, (C2) BLU; increase the colors to create a white horizontal line.
19. Confirm that a good gray scale is established by viewing B/W color bar pattern.
20. In the Serviceman Mode for making electronic adjustments select the DAC DRIVE adjustments (C3) RED, (C4) BLU and adjust for warm white in a white color bar pattern.
25. EXIT the Serviceman Mode.
26. Adjust the Picture Menu Video Adjustments **Bright** and **Picture** from low scale to high scale and check Black and White tracking.
27. If correction is needed: Re–Enter the Serviceman Mode and perform the **Minor Touch – Up Method.**
28. Perform **Sub–Brightness** Adjustment procedure.

Sub–Brightness

Serviceman DAC Adjustment (B2)

Adjustment of this control is important for setting proper operation of customer brightness and picture controls. This adjustment must be made after Sub–Contrast or Color Temperature adjustments are made. **Do not adjust** SCREEN after the Sub–Brightness is set.

Preparation:

1. Apply a color bar signal with 100 IRE white and 7.5 IRE black. (Switch Color to "OFF" on the signal generator.) Operate the Receiver for a minimum of 10 minutes prior to performing this adjustment.
2. Preset the following controls:
   - Color .... Center
   - Picture .... Max.
   - Tint .... Center

Procedure:

In the Serviceman Mode for making electronic adjustments, select the DAC adjustment (B2) and adjust until the black bar starts to look grey. Then decrease the level to the point where grey turns to black.

Service Adjustments (Electronic Controls,cont.)

Horizontal Centering

Serviceman DAC Adjustment (C9)

Preparation:

Connect a crosshatch generator.

Procedure:

1. In the Serviceman Mode for making electronic adjustments. Select the Horizontal Centering Adjustment DAC (C9) and adjust until the center of the crosshatch pattern is centered on CRT.
2. EXIT the Serviceman Adjustment Mode.

Audio Adjustment

Serviceman DAC Adjustment (B6)

This adjustment is factory set and needs to be performed only when IC002 or IC101 is replaced.

Preparation:

1. Apply the following signal at the antenna (70dB ±5dB, 75Ω open P/S 10dB): audio signal set to monaural, 300Hz. 100% modulation; video input of 100 IRE flat field, 30% modulation.
2. Connect the RMS Meter with filter jig as shown in Figure 27.

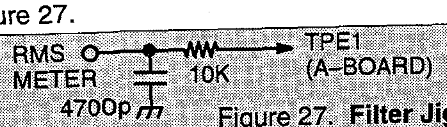


Figure 27. **Filter Jig**

Procedure:

1. In the Serviceman Mode for making electronic adjustments, select the Audio Adjustment DAC (B6) and adjust until the RMS meter reading are:
   150mV RMS ±7.5mV RMS (Stereo models)
   250mV RMS ±12.5mV RMS (Mono models)
2. EXIT the Serviceman Adjustment Mode.

Clock Adjustment (Sb)

Preparation:

Connect the frequency counter from TPS1 (IC001 Pin 13) to cold ground (⏚).

NOTE: Frequency Counter probe capacitance should be 8pF or less.

Procedure:

1. Turn the Receiver "OFF" with the AC power applied.
2. Measure TPS1 (IC001 pin 13) for the frequency of the waveform and record the reading.

   Note: Pin 13 measurement must have at least four digits of resolution following the decimal point Example: 000.0000
3. Turn the Receiver "ON".
4. Place the Receiver into Serviceman Mode for making electronic adjustment, select the Clock Adjustment DAC (Sb).
5. Calculate and set Sb based on the following formula:

$$Sb = 128 + 0.901 \times 10^6 \times \frac{\{244.1406 - \text{pin 13 [Hz]}\}}{244.1406}$$

NOTE: Pin 13 measurement will not change regardless of the value stored in Sb.

Vertical Size (B7)

1. Adjust the VERTICAL SIZE DAC control, B7, until the top and the bottom edges of the raster are visible.
2. Adjust the VERTICAL SIZE control B7, until the top and the bottom of the raster touch the bezel edge. Then advance SIZE control to obtain an approximately 10% overscan. Linearity adjustment is done automatically when the size is being adjusted. (Best results can be obtained with a round test pattern.)

Service Adjustments (Mechanical Controls)

VCO Field Alignment L105

1. Connect a balance antenna and select a midband channel (Ch 10, 11 or 12)
2. Attenuate the signal strength for a weak noisy video.
3. While observing the picture tube, adjust L105 until best picture appears.
4. Change channels and observe that they are tuning properly.
5. If the channel monitored is not clear, repeat steps 1, 3 and 4 while applying a stronger signal.

Focus (Part of T551)

Preparation:

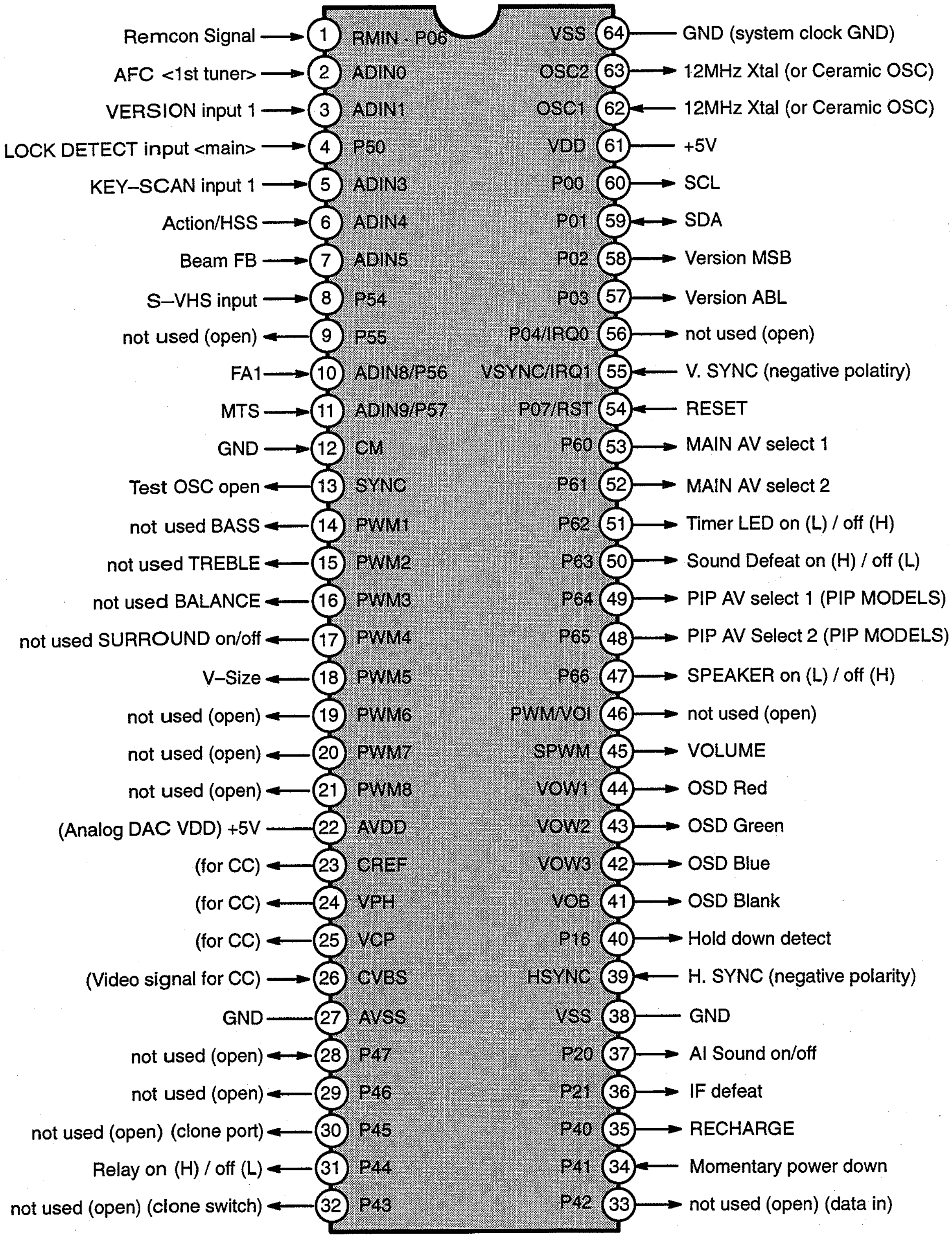
Connect a Signal generator and select a dot pattern.

Procedure:

Adjust the FOCUS control to obtain the sharpest and clearest dot pattern.

a. adjust for best center.
b. adjust for best area between the center and top right corner.

IC001 MPU IN/OUT Pins and Functions
MN1873265T9G


Remcon Signal 1 RMIN · P06
AFC <1st tuner> 2 ADIN0
VERSION input 1 3 ADIN1
LOCK DETECT input <main> 4 P50
KEY–SCAN input 1 5 ADIN3
Action/HSS 6 ADIN4
Beam FB 7 ADIN5
S–VHS input 8 P54
not used (open) 9 P55
FA1 10 ADIN8/P56
MTS 11 ADIN9/P57
GND 12 CM
Test OSC open 13 SYNC
not used BASS 14 PWM1
not used TREBLE 15 PWM2
not used BALANCE 16 PWM3
not used SURROUND on/off 17 PWM4
V–Size 18 PWM5
not used (open) 19 PWM6
not used (open) 20 PWM7
not used (open) 21 PWM8
(Analog DAC VDD) +5V 22 AVDD
(for CC) 23 CREF
(for CC) 24 VPH
(for CC) 25 VCP
(Video signal for CC) 26 CVBS
GND 27 AVSS
not used (open) 28 P47
not used (open) 29 P46
not used (open) (clone port) 30 P45
Relay on (H) / off (L) 31 P44
not used (open) (clone switch) 32 P43
VSS 64 GND (system clock GND)
OSC2 63 12MHz Xtal (or Ceramic OSC)
OSC1 62 12MHz Xtal (or Ceramic OSC)
VDD 61 +5V
P00 60 SCL
P01 59 SDA
P02 58 Version MSB
P03 57 Version ABL
P04/IRQ0 56 not used (open)
VSYNC/IRQ1 55 V. SYNC (negative polatiry)
P07/RST 54 RESET
P60 53 MAIN AV select 1
P61 52 MAIN AV select 2
P62 51 Timer LED on (L) / off (H)
P63 50 Sound Defeat on (H) / off (L)
P64 49 PIP AV select 1 (PIP MODELS)
P65 48 PIP AV Select 2 (PIP MODELS)
P66 47 SPEAKER on (L) / off (H)
PWM/VOI 46 not used (open)
SPWM 45 VOLUME
VOW1 44 OSD Red
VOW2 43 OSD Green
VOW3 42 OSD Blue
VOB 41 OSD Blank
P16 40 Hold down detect
HSYNC 39 H. SYNC (negative polarity)
VSS 38 GND
P20 37 AI Sound on/off
P21 36 IF defeat
P40 35 RECHARGE
P41 34 Momentary power down
P42 33 not used (open) (data in)

IC101 Block Diagram

INPUT PINS = ◁ ▷ OUTPUT PINS = ◀ ▶

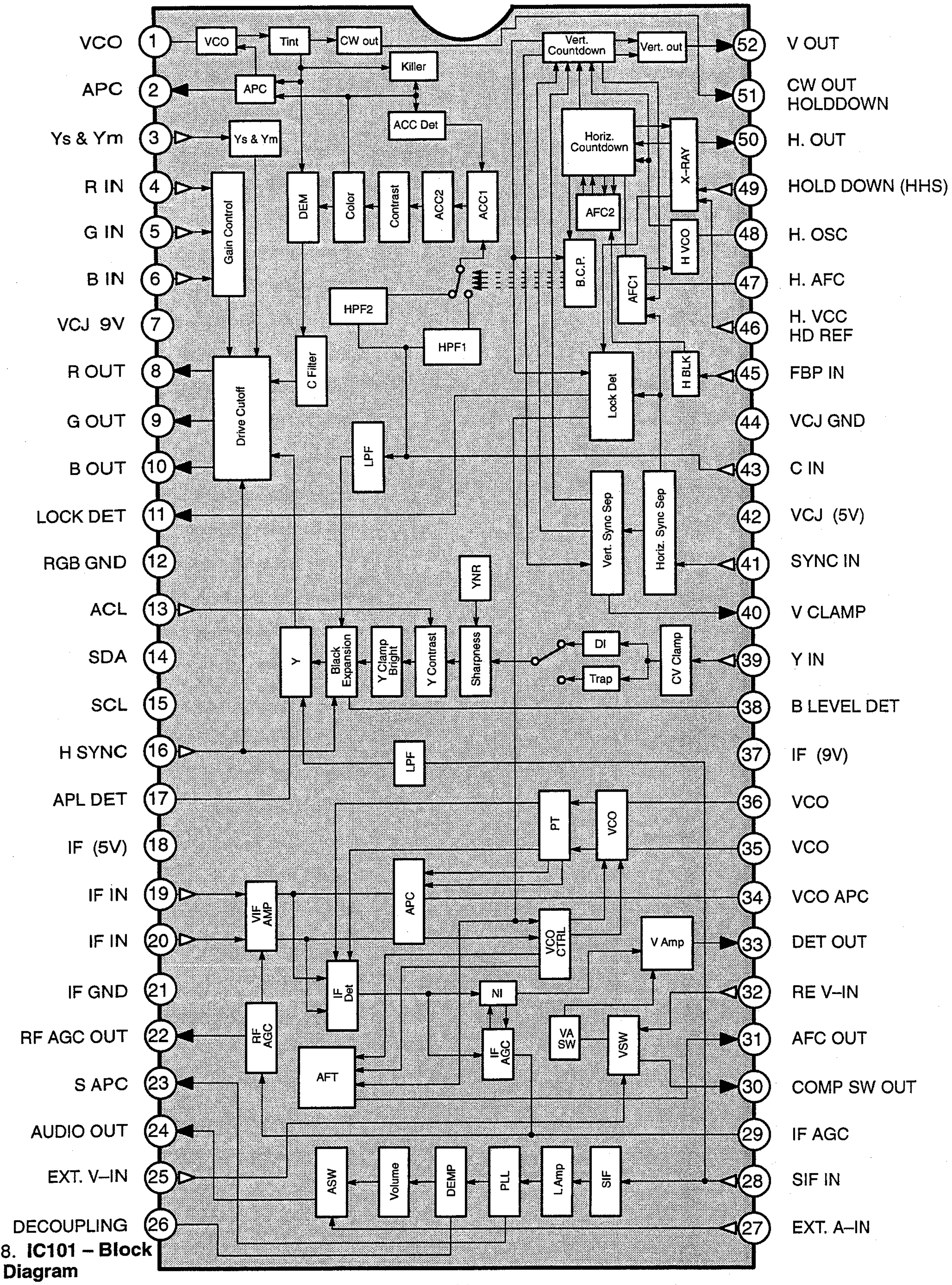

1 VCO
2 APC
3 Ys & Ym
4 R IN
5 G IN
6 B IN
7 VCJ 9V
8 R OUT
9 G OUT
10 B OUT
11 LOCK DET
12 RGB GND
13 ACL
14 SDA
15 SCL
16 H SYNC
17 APL DET
18 IF (5V)
19 IF IN
20 IF IN
21 IF GND
22 RF AGC OUT
23 S APC
24 AUDIO OUT
25 EXT. V–IN
26 DECOUPLING
52 V OUT
51 CW OUT HOLDDOWN
50 H. OUT
49 HOLD DOWN (HHS)
48 H. OSC
47 H. AFC
46 H. VCC HD REF
45 FBP IN
44 VCJ GND
43 C IN
42 VCJ (5V)
41 SYNC IN
40 V CLAMP
39 Y IN
38 B LEVEL DET
37 IF (9V)
36 VCO
35 VCO
34 VCO APC
33 DET OUT
32 RE V–IN
31 AFC OUT
30 COMP SW OUT
29 IF AGC
28 SIF IN
27 EXT. A–IN
VCO
Tint
CW out
Killer
APC
ACC Det
Ys & Ym
Gain Control
DEM
Color
Contrast
ACC2
ACC1
HPF2
HPF1
C Filter
Drive Cutoff
LPF
Vert. Countdown
Vert. out
Horiz. Countdown
X-RAY
AFC2
H VCO
B.C.P.
AFC1
Lock Det
H BLK
Vert. Sync Sep
Horiz. Sync Sep
YNR
Y
Black Expansion
Y Clamp Bright
Y Contrast
Sharpness
DI
Trap
CV Clamp
LPF
PT
VCO
APC
VIF AMP
VCO CTRL
V Amp
IF Det
NI
RF AGC
IF AGC
VA SW
VSW
AFT
ASW
Volume
DEMP
PLL
L Amp
SIF

Figure 28. **IC101 – Block Diagram**

Notes

REPLACEMENT PARTS LIST

(Models: CT–32G12V/CV & CT–32G22V/CV)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
		CAPRISTORS	C311	ECA1EM4R7	CAP,E 4.7UF/25V
CRA801	**EXNG471P365**	**RES–CAP 470PF/3.6 MEG**	C312	ECA1EM330	CAP,E 33UF/25V
CRA802	**EXNG471P365**	**RES–CAP 470PF/3.6 MEG**	C315	ECUX1H680JCX	CAP,C 68PF–J–50V
		CAPACITORS			CT–32G22V CT–32G22CV
C001	ECA1AM101	CAP,E 100UF/10V	C351	TACCW331T50V	CAP,C 330PF/50V
C003	ECA1HM4R7	CAP,E 4.7UF/50V			CT–32G22V CT–32G22CV
C008	TCUX1H103ZFN	CAP,C .01UF–Z–50V	C351	TACCW391T50V	CAP,C 390PF/50V
C010	TCUX1H103ZFN	CAP,C .01UF–Z–50V			CT–32G12V CT–32G12CV
C011	ECA1CM221	CAP,E 220UF/16V	C352	TACCW331T50V	CAP,C 330PF/50V
C013	ECA0JM101	CAP,E 100UF/6.3V			CT–32G22V CT–32G22CV
C016	ECUX1H101JCX	CAP,C 100PF–J–50V	C352	TACCW391T50V	CAP,C 390PF/50V
C017	ECUX1H220JCX	CAP,C 22PF–J–50V			CT–32G12V CT–32G12CV
C018	ECUX1H220JCX	CAP,C 22PF–J–50V	C353	TACCW331T50V	CAP,C 330PF/50V
C019	ECA0JM101	CAP,E 100UF/6.3V			CT–32G22V CT–32G22CV
C020	ECA0JM101	CAP,E 100UF/6.3V	C353	TACCW391T50V	CAP,C 390PF/50V
C021	TCUX1H103ZFN	CAP,C .01UF–Z–50V			CT–32G12V CT–32G12CV
C022	ECA1CM471	CAP,E 470UF/16V	C354	ECKD3D102KB	CAP,C .001UF–K–2KV
C024	ECA1EM4R7	CAP,E 4.7UF/25V	C357	ECEA1HN010U	CAP,E 1UF/50V
C025	ECUX1H101JCX	CAP,C 100PF–J–50V	C401	ECQB1H153KF	CAP,P .015UF–K–50V
C026	ECA1HM010	CAP,E 1.0UF/50V	C402	ECUX1H471JCX	CAP,C 470PF–J–50V
C031	ECUX1H821KBX	CAP,C 820PF–K–50V	C403	ECA1HM2R2	CAP,E 2.2UF/50V
C032	ECA1CM470	CAP,E 47UF/16V	C451	ECEA1CGE470	CAP,E 47UF/16V
C033	ECUX1H680JCX	CAP,C 68PF–J–50V	C452	ECSF1EE105	CAP,T 1.0UF/25V
		CT–32G12V CT–32G12CV	C453	ECEA1HFS010	CAP,E 1UF/50V
C034	ECUX1H680JCX	CAP,C 68PF–J–50V	C454	ECA1EM102	CAP,E 1000UF/25V
		CT–32G12V CT–32G12CV	C455	ECEA1VGE101	CAP,E 100UF/35V
C036	ECUX1H220JCX	CAP,C 22PF–J–50V	C456	ECQB1H103JF	CAP,P .01UF–J–50V
C037	ECUX1H220JCX	CAP,C 22PF–J–50V	C459	ECEA1VGE471	CAP,E 470UF/35V
C038	ECUX1H220JCX	CAP,C 22PF–J–50V	C460	ECQM1104JZ	CAP,P .1UF–J–100V
C101	ECUX1H223ZFX	CAP,C .022UF–Z–50V	C462	ECA1HM100	CAP,E 10UF/50V
C102	ECA1EM100	CAP,E 10UF/25V	C501	ECUX1H821KBX	CAP,C 820PF–K–50V
C103	ECUX1H300JCX	CAP,C 30PF–J–50V	C502	ECQB1H223JF	CAP,P .022UF–J–50V
C105	ECUX1H221JCX	CAP,C 220PF–J–50V	C503	ECA1HM2R2	CAP,E 2.2UF/50V
C106	ECA1HMR47	CAP,E .47UF/50V	C504	ECUX1H221JCX	CAP,C 220PF–J–50V
C107	ECUX1H470JCX	CAP,C 47PF–J–50V	C505	ECUX1H221JUX	CAP,C 220PF–J–50V
C108	ECA1HMR22	CAP,E .22UF/50V	C506	ECA1CM221	CAP,E 220UF/16V
C109	ECEA1EN4R7U	CAP,E 4.7UF–25V	C510	ECCD2H100D	CAP,C 10PF–D–500V
C110	TCUX1H103ZFN	CAP,C .01UF–Z–50V	C511	ECKD2H821KB	CAP,C 820PF–K–500V
C111	ECA1EM100	CAP,E 10UF/25V	C512	ECKD2H101KB	CAP,C 100PF–K–500V
C113	ECA1EM100	CAP,E 10UF/25V	**C531**	**ECA1EM220**	**CAP,E 22UF/25V**
C114	ECUX1H040CCX	CAP,C 4PF–C–50V	C532	ECA1CM102	CAP,E 1000UF/16V
		CT–32G22V CT–32G22CV	C534	TCUX1H103ZFN	CAP,C .01UF–Z–50V
C114	ECUX1H070DCX	CAP,C 7PF–D–50V	**C551**	**ECA1VM331**	**CAP,E 330UF/35V**
		CT–32G12V CT–32G12CV	**C552**	**ECA1CM331**	**CAP,E 330UF/16V**
C151	ECA1HMR22	CAP,E .22UF/50V			**CT–32G22V CT–32G22CV**
C201	TCUX1H103ZFN	CAP,C .01UF–Z–50V	**C553**	**ECA1CM331**	**CAP,E 330UF/16V**
C202	ECUX1H101JCX	CAP,C 100PF–J–50V			**CT–32G22V CT–32G22CV**
C203	ECA1EM4R7	CAP,E 4.7UF/25V	C554	ECKD2H561KB	CAP,C 560PF–K–500V
C301	ECUX1H390JCX	CAP,C 39PF–J–50V	**C555**	**ECEA2EU220**	**CAP,E 22UF/250V**
C302	ECEA1HN010U	CAP,E 1UF/50V	**C556**	**ECA1CM102**	**CAP,E 1000UF/16V**
C304	ECEA1HNR47U	CAP,E .47UF–50V	C557	ECKD2H102KB	CAP,C .001UF–K–500V
C305	ECA1HM4R7	CAP,E 4.7UF/50V	C558	ECA1CM221	CAP,E 220UF/16V
C306	ECA1CM221	CAP,E 220UF/16V			CT–32G22V CT–32G22CV
C308	ECQB1H823KF	CAP,P .082UF–K–50V	C559	ECA1HM220	CAP,E 22UF/50V
C309	ECA1AM101	CAP,E 100UF/10V	**C560**	**ECEA1HN2R2U**	**CAP,E 2.2UF/50V**
C310	ECA1EM4R7	CAP,E 4.7UF/25V	C561	ECKD2H561KB	CAP,C 560PF–K–500V

REPLACEMENT PARTS LIST

(Models: CT–32G12V/CV & CT–32G22V/CV)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION
C562	ECKD2H561KB	CAP,C 560PF–K–500V CT–32G22V CT–32G22CV
C563	**ECWH12H133JS**	**CAP,P .013UF–J–1.2KV**
C564	**ECWH12H122JS**	**CAP,P .0012UF–J–1.2KV**
C565	**ECKD3D561JB**	**CAP,C 560PF–J–2KV**
C566	**ECKD3D181JB**	**CAP,C 180PF–J–2KV**
C567	**ECQM4562JZ**	**CAP,P 5600UF–J–400V**
C568	**ECQM4473JZ**	**CAP,P .047UF–J–400V**
C569	**ECWF2434JBK**	**CAP,M .43UF–J–200V**
C571	ECA1CM471	CAP,E 470UF/16V
C572	ECA1EM100	CAP,E 10UF/25V
C573	ECA1CM101	CAP,E 100UF/16V
C574	ECKD2H471KB	CAP,C 470PF–K–500V
C601	ECUX1H102KBX	CAP,C .001UF–K–50V CT–32G22V CT–32G22CV
C601	ECUX1H181JCX	CAP,C 180PF–J–50V CT–32G12V CT–32G12CV
C602	ECUX1H680JCX	CAP,C 68PF–J–50V CT–32G12V CT–32G12CV
C604	ECUX1H150JUX	CAP,C 15PF–J–50V
C605	ECUX1H332KBX	CAP,C .0033UF–K–50V
C606	ECA1HM010	CAP,E 1.0UF/50V
C754	ECQB1H104KF	CAP,P .1UF–K–50V
C755	ECQB1H104KF	CAP,P .1UF–K–50V
C756	ECA1CM221	CAP,E 220UF/16V
C757	ECA1VM221	CAP,E 220UF/35V
C759	ECQE1395KN	CAP,P 3.9UF–K–100V
C801	**ECKD2H472PU**	**CAP,C .0047UF–P–500V**
C802	**ECKD2H472PU**	**CAP,C .0047UF–P–500V**
C803	ECKD2H472PU	CAP,C .0047UF–P–500V
C804	ECKD2H472PU	CAP,C .0047UF–P–500V
C805	**EC0S2DA221BB**	**CAP,E 220UF/200V** **CT–32G12V CT–32G12CV**
C805	**EC0S2DA331BB**	**CAP,E 330UF/200V** **CT–32G22V CT–32G22CV**
C806	**EC0S2DA221BB**	**CAP,E 220UF/200V** **CT–32G12V CT–32G12CVC**
C806	**EC0S2DA331BB**	**CAP,E 330UF/200V** **CT–32G22V CT–32G22CV**
C807	ECA1HM2R2	CAP,E 2.2UF/50V
C808	ECA1CM101	CAP,E 100UF/16V
C809	**EC0S2DG151DG**	**CAP,E 151UF/200V**
C810	**ECQU2A153MN**	**CAP,P .015UF–M–250VAC**
C811	**ECQU2A153MN**	**CAP,P .015UF–M–250VAC**
C812	**ECQU2A224MN**	**CAP,P .22UF–M–250VAC**
C814	ECQB1H333JF	CAP,P .033UF–J–50V
C815	ECEA1EGE101	CAP,E 100UF/25V
C818	ECKD3A821KB	CAP,C 820PF–K–1KVDC
C820	**ECEA1JGE100**	**CAP,E 10UF/63V**
C821	ECKD2H561KB	CAP,C 560PF–K–500V CT–32G12CV CT–32G22CVC
C821	ECKD3A561KB	CAP,C 560PF–K–1KV CT–32G12V CT–32G22VM
C822	**ECA1EM221**	**CAP,E 220UF/25V**
C823	**ECEA160V33Z**	**CAP,E 33UF/160V**
C824	ECKD3A331KB	CAP,C 330PF–K–1KVDC
C825	ECKD3A471KB	CAP,C 470PF–K–1KV
C1801	TCUX1H103ZFN	CAP,C .01UF–Z–50V CT–32G22V CT–32G22CV
C1802	ECQB1H154JF	CAP,P .15UF–J–50V CT–32G22V CT–32G22CV
C1803	ECEA1HKAR22	CAP,E .22UF/50V CT–32G22V CT–32G22CV
C1804	ECEA1HKAR22	CAP,E .22UF/50V CT–32G22V CT–32G22CV
C1805	ECUX1H333ZFX	CAP,C .033UF–Z–50V CT–32G22V CT–32G22CV
C1806	TCUX1H103ZFN	CAP,C .01UF–Z–50V CT–32G22V CT–32G22CV
C1807	ECEA1CKA470	CAP,E 47UF/16V CT–32G22V CT–32G22CV
C1808	TCUX1H103ZFN	CAP,C .01UF–Z–50V CT–32G22V CT–32G22CV
C1809	ECEA1CKA470	CAP,E 47UF/16V CT–32G22V CT–32G22CV
C1810	ECUX1H104ZFX	CAP,C .1UF–Z–50V CT–32G22V CT–32G22CV
C1811	TCUX1H103ZFN	CAP,C .01UF–Z–50V CT–32G22V CT–32G22CV
C1812	TCUX1H103ZFN	CAP,C .01UF–Z–50V CT–32G22V CT–32G22CV
C1813	TCUX1H103ZFN	CAP,C .01UF–Z–50V CT–32G22V CT–32G22CV
C1814	ECEA1CKA470	CAP,E 47UF/16V CT–32G22V CT–32G22CV
C1815	ECUX1H104ZFX	CAP,C .1UF–Z–50V CT–32G22V CT–32G22CV
C1816	TCUX1H103ZFN	CAP,C .01UF–Z–50V CT–32G22V CT–32G22CV
C1817	TCUX1H103ZFN	CAP,C .01UF–Z–50V CT–32G22V CT–32G22CV
C1818	ECEA1CKA100	CAP,E 10UF/16V CT–32G22V CT–32G22CV
C1819	ECUX1H104ZFX	CAP,C .1UF–Z–50V CT–32G22V CT–32G22CV
C1820	ECEA1CKA470	CAP,E 47UF/16V CT–32G22V CT–32G22CV
C1821	ECUX1H150JCX	CAP,C 15PF–J–50V CT–32G22V CT–32G22CV
C1822	ECUX1H120JCX	CAP,C 12PF–J–50V CT–32G22V CT–32G22CV
C1823	ECUX1H680JCX	CAP,C 68PF–J–50V CT–32G22V CT–32G22CV
C1826	TCUX1H103ZFN	CAP,C .01UF–Z–50V CT–32G22V CT–32G22CV
C1827	TCUX1H103ZFN	CAP,C .01UF–Z–50V CT–32G22V CT–32G22CV
C1828	TCUX1H103ZFN	CAP,C .01UF–Z–50V CT–32G22V CT–32G22CV
C1829	ECUX1H104ZFX	CAP,C .1UF–Z–50V CT–32G22V CT–32G22CV

REPLACEMENT PARTS LIST

(Models: CT–32G12V/CV & CT–32G22V/CV)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION
C1830	ECUX1H151JCX	CAP,C 150PF–J–50V CT–32G22V CT–32G22CV
C1831	ECUX1H104ZFX	CAP,C .1UF–Z–50V CT–32G22V CT–32G22CV
C1832	ECUX1H104ZFX	CAP,C .1UF–Z–50V CT–32G22V CT–32G22CV
C1833	ECUX1H104ZFX	CAP,C .1UF–Z–50V CT–32G22V CT–32G22CV
C1835	ECEA1CKA100	CAP,E 10UF/16V CT–32G22V CT–32G22CV
C1836	ECUX1H680JCX	CAP,C 68PF–J–50V CT–32G22V CT–32G22CV
C1837	ECUX1H104ZFX	CAP,C .1UF–Z–50V CT–32G22V CT–32G22CV
C1839	ECUX1H680JCX	CAP,C 68PF–J–50V CT–32G22V CT–32G22CV
C1840	ECUX1H680JCX	CAP,C 68PF–J–50V CT–32G22V CT–32G22CV
C2201	AP335K016CAE	CAP,T 3.3UF/16V
C2202	ECA1EM4R7	CAP,E 4.7UF/25V
C2203	ECA1HM010	CAP,E 1.0UF/50V
C2204	ECA1EM4R7	CAP,E 4.7UF/25V
C2205	ECA1EM4R7	CAP,E 4.7UF/25V
C2206	ECA1EM4R7	CAP,E 4.7UF/25V
C2207	ECA1EM4R7	CAP,E 4.7UF/25V
C2208	ECA1EM4R7	CAP,E 4.7UF/25V
C2209	ECA1CM101	CAP,E 100UF/16V
C2210	ECA1HMR33	CAP,E .33UF/50V
C2211	ECEA1HFSR68	CAP,E .68UF–50V
C2212	ECA1HM2R2	CAP,E 2.2UF/50V
C2213	ECA1EM100	CAP,E 10UF/25V
C2214	ECQB1H104JF	CAP,P .1UF–J–50V
C2215	ECQB1H223JF	CAP,P .022UF–J–50V
C2216	ECUX1H332KBX	CAP,C .0033UF–K–50V
C2217	ECEA1HN010U	CAP,E 1UF/50V
C2218	ECEA1HN010U	CAP,E 1UF/50V
C2219	AP106K016CAE	CAP,T 10UF/16V
C2220	ECEA1CN100U	CAP,E 10UF–16V
C2221	TCUX1H103KBN	CAP,C .01UF–K–50V
C2222	ECUX1H472KBX	CAP,C .0047UF–K–50V
C2301	ECA1EM102	CAP,E 1000UF/25V
C2302	ECA1EM100	CAP,E 10UF/25V
C2303	ECUX1H392KBX	CAP,C .0039UF–K–50V
C2304	ECUX1H392KBX	CAP,C .0039UF–K–50V
C2305	ECA1EM100	CAP,E 10UF/25V
C2307	ECA1CM102	CAP,E 1000UF/16V
C2308	ECEA1EN470U	CAP,E 47UF/25V
C2309	ECQB1H104JF	CAP,P .1UF–J–50V
C2313	ECA1CM101	CAP,E 100UF/16V
C2314	ECQB1H104JF	CAP,P .1UF–J–50V
C2315	ECA1EM100	CAP,E 10UF/25V
C2316	ECA1CM101	CAP,E 100UF/16V
C2317	ECEA1EN470U	CAP,E 47UF/25V
C2318	ECUX1H102KBX	CAP,C .001UF–K–50V
C2319	ECUX1H102KBX	CAP,C .001UF–K–50V
C2320	ECA1CM101	CAP,E 100UF/16V
C2325	ECA1CM102	CAP,E 1000UF/16V
C2331	ECEA1CN100U	CAP,E 10UF–16V
C2332	ECEA1CN100U	CAP,E 10UF–16V
C2341	ECA1HM010	CAP,E 1.0UF/50V CT–32G12V CT–32G12CV
C2343	ECA1HM010	CAP,E 1.0UF/50V CT–32G12V CT–32G12CV
C2344	ECA1AM102	CAP,E 1000UF/10V CT–32G12V CT–32G12CV
C2345	ECA1EM220	CAP,E 22UF/25V CT–32G12V CT–32G12CV
C2346	ECA1HM010	CAP,E 1.0UF/50V CT–32G12V CT–32G12CV
C2349	ECA1HM470	CAP,E 47UF/50V CT–32G12V CT–32G12CV
C2351	ECEA1HN010U	CAP,E 1UF/50V CT–32G22V CT–32G22CV
C2353	ECEA1HN010U	CAP,E 1UF/50V CT–32G22V CT–32G22CV
C2355	ECA1EM220	CAP,E 22UF/25V CT–32G22V CT–32G22CV
C2356	ECA1HM010	CAP,E 1.0UF/50V CT–32G22V CT–32G22CV
C2358	ECA1CM221	CAP,E 220UF/16V CT–32G22V CT–32G22CV
C2359	ECA1CM470	CAP,E 47UF/16V CT–32G22V CT–32G22CV
C2360	ECA1HM010	CAP,E 1.0UF/50V
C2401	ECKF1H103ZF	CAP,C .01UF–Z–50V CT–32G12V CT–32G12CV
C2402	ECA1HM470	CAP,E 47UF/50V CT–32G12V CT–32G12CV
C2451	ECA1EM100	CAP,E 10UF/25V
C2452	ECA1EM100	CAP,E 10UF/25V
C2453	ECA1EM4R7	CAP,E 4.7UF/25V
C2454	ECA1CM221	CAP,E 220UF/16V
C3011	ECA1HM010	CAP,E 1.0UF/50V CT–32G22V CT–32G22CV
C3011	ECA1HM4R7	CAP,E 4.7UF/50V CT–32G12V CT–32G12CV
C3012	ECA1HM010	CAP,E 1.0UF/50V
C3013	ECA1EM100	CAP,E 10UF/25V CT–32G22V CT–32G22CV
C3013	ECA1HM010	CAP,E 1.0UF/50V CT–32G12V CT–32G12CV
C3014	ECA1EM100	CAP,E 10UF/25V CT–32G22V CT–32G22CV
C3015	ECA1EM100	CAP,E 10UF/25V CT–32G22V CT–32G22CV
C3016	TCUX1H103ZFN	CAP,C .01UF–Z–50V CT–32G22V CT–32G22CV
C3017	TCUX1H103KBN	CAP,C .01UF–K–50V CT–32G22V CT–32G22CV
C3018	ECA1HM010	CAP,E 1.0UF/50V CT–32G22V CT–32G22CV

REPLACEMENT PARTS LIST

(Models: CT–32G12V/CV & CT–32G22V/CV)

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REF. NO.	PART NO.	DESCRIPTION
C3019	ECA1HM010	CAP,E 1.0UF/50V CT–32G22V CT–32G22CV
C3020	ECA1CM470	CAP,E 47UF/16V CT–32G22V CT–32G22CV
C3022	ECA1EM220	CAP,E 22UF/25V CT–32G22V CT–32G22CV
C3023	ECA1CM470	CAP,E 47UF/16V CT–32G22V CT–32G22CV
C3024	TCUX1H103ZFN	CAP,C .01UF–Z–50V CT–32G22V CT–32G22CV
C3025	ECA1EM220	CAP,E 22UF/25V CT–32G22V CT–32G22CV
C3071	ECA1EM220	CAP,E 22UF/25V CT–32G22V CT–32G22CVC
C3072	TCUX1H103KBN	CAP,C .01UF–K–50V CT–32G22V CT–32G22CV
C3201	ECA1CM470	CAP,E 47UF/16V CT–32G22V CT–32G22CV
C3202	ECQB1H473JF	CAP,P .047UF–J–50V CT–32G22V CT–32G22CV
C3203	TCUX1H103KBN	CAP,C .01UF–K–50V CT–32G22V CT–32G22CV
C3204	TCUX1H103KBN	CAP,C .01UF–K–50V CT–32G22V CT–32G22CV
C3206	ECA1EM220	CAP,E 22UF/25V CT–32G22V CT–32G22CV
C3207	TCUX1H103KBN	CAP,C .01UF–K–50V CT–32G22V CT–32G22CV
C3209	ECUX1H101JCX	CAP,C 100PF–J–50V CT–32G22V CT–32G22CV
C4304	ECEA1CKA100	CAP,E 10UF/16V CT–32G22V CT–32G22CV
C4307	ECEA1CKN100	CAP,E 10UF/16V CT–32G22V CT–32G22CV
C4313	ECUX1H391KBX	CAP,C 390PF–K–50V CT–32G22V CT–32G22CV
C4314	ECEA1HKAR47	CAP,E .47UF/50V CT–32G22V CT–32G22CV
C4315	ECUX1H152KBX	CAP,C .0015UF–K–50V CT–32G22V CT–32G22CV
C4316	ECEA0JKA331	CAP,E 330UF/6.3V CT–32G22V CT–32G22CV
C4317	TCUX1H103ZFN	CAP,C .01UF–Z–50V CT–32G22V CT–32G22CV
C4319	ECUX1H391JCX	CAP,C 390PF–J–50V CT–32G22V CT–32G22CV
C4320	ECUX1H681KBX	CAP,C 680PF–K–50V CT–32G22V CT–32G22CV
C4357	TCUX1H103ZFN	CAP,C .01UF–Z–50V CT–32G22V CT–32G22CV
C4358	ECA1CM470	CAP,E 47UF/16V CT–32G22V CT–32G22CV
C4411	ECA1EM100	CAP,E 10UF/25V CT–32G22V CT–32G22CV
C4412	ECA1CM100	CAP,E 10UF/16V CT–32G22V CT–32G22CV

REF. NO.	PART NO.	DESCRIPTION
C4414	ECA1CM100	CAP,E 10UF/16V CT–32G22V CT–32G22CV
C4415	ECA1EM100	CAP,E 10UF/25V CT–32G22V CT–32G22CV
C4416	ECA1EM100	CAP,E 10UF/25V CT–32G22V CT–32G22CV
		DIODES
D001	ERA15–01	DIODE
D002	MA165	DIODE
D003	MA4047M	DIODE, ZENER
D006	MA4330H	DIODE
D008	MA165	DIODE
D009	MA165	DIODE
D011	MA165	DIODE
D016	MA165	DIODE
D017	MA165	DIODE
D451	ERA15–01	DIODE
D452	MA4047M	DIODE, ZENER
D501	MA4082L	DIODE
D531	**AS01**	**DIODE**
D532	**MA4062L**	**DIODE**
D551	**TVSRU2N**	**DIODE**
D554	**BYD33G–143**	**DIODE**
D555	MA165	DIODE
D556	MA4360H	DIODE, ZENER
D557	**BYD33G–143**	**DIODE** **CT–32G22V CT–32G22CV**
D558	**RS3FS**	**DIODE**
D559	**BYD33G–113**	**DIODE**
D560	MA165	DIODE
D561	**BYD33G–143**	**DIODE**
D751	MA2270B	DIODE
D801	**RM10BLFA1**	**DIODE**
D802	**RM10BLFA1**	**DIODE**
D805	**TRPW5B0M030D**	**THERMISTOR**
D806	MA4047H	DIODE
D807	MA165	DIODE
D809	**BYD33G–143**	**DIODE** **CT–32G12CV CT–32G22CV**
D809	**RU3YX–M**	**DIODE** **CT–32G12V CT–32G22V**
D820	EU02V1	DIODE
D821	EU02V1	DIODE
D822	EU02V1	DIODE
D823	RL30A	DIODE
D824	EU02V1	DIODE
D825	**TVSSR2KL**	**DIODE, PROTECTION**
D826	EU02V1	DIODE
D829	MA165	DIODE
D830	MA4270M	DIODE
D2303	MA4068M	DIODE, ZENER
D2321	MA151K	DIODE CT–32G22V CT–32G22CV
D2321	MA165	DIODE CT–32G12V CT–32G12CV
D3001	MA165	DIODE

REPLACEMENT PARTS LIST

(Models: CT–32G12V/CV & CT–32G22V/CV)

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REF. NO.	PART NO.	DESCRIPTION
D3011	MA3110M	DIODE, ZENER CT–32G22V CT–32G22CV
D3014	MA3110M	DIODE, ZENER CT–32G22V CT–32G22CV
D3015	MA3110M	DIODE, ZENER CT–32G22V CT–32G22CV
D3016	MA4110M	DIODE, ZENER CT–32G12V CT–32G12CV
D3017	MA4110M	DIODE, ZENER CT–32G12V CT–32G12CV
D3018	MA3110M	DIODE, ZENER CT–32G22V CT–32G22CV
D3018	MA4110M	DIODE, ZENER CT–32G12V CT–32G12CV
D3019	MA3110M	DIODE, ZENER CT–32G22V CT–32G22CV
D3019	MA4110M	DIODE, ZENER CT–32G12V CT–32G12CV
D3020	MA3110M	DIODE, ZENER CT–32G22V CT–32G22CV
D3020	MA4110M	DIODE, ZENER CT–32G12V CT–32G12CV
D3021	MA3110M	DIODE, ZENER CT–32G22V CT–32G22CV
D3021	MA4110M	DIODE, ZENER CT–32G12V CT–32G12CV
D3022	MA3110M	DIODE, ZENER CT–32G22V CT–32G22CV
D3023	MA3110M	DIODE, ZENER CT–32G22V CT–32G22CV
D3024	MA3110M	DIODE, ZENER CT–32G22V CT–32G22CV
D3025	MA3110M	DIODE, ZENER CT–32G22V CT–32G22CV
D3026	MA3110M	DIODE, ZENER CT–32G22V CT–32G22CV
D3027	MA151WK	DIODE CT–32G22V CT–32G22CV
D4301	MA3036H	DIODE CT–32G22V CT–32G22CV
D4302	MA4062L	DIODE CT–32G22V CT–32G22CV
		FUSES
F801	**0BA1C63NU100**	**FUSE (6.3A–125V)**
		INTEGRATED CIRCUITS
IC001	MN1873265T9G	INT CKT
IC002	24LC02BIP	INT CKT
IC003	RPM–637CBRS1	IR RECEIVER, REMOTE CONTROL
IC101	**AN5165K**	**INT CKT**
IC451	LA7838	INT CKT
IC551	AN78M09	PLUS 9V AVR
IC552	AN78M05	PLUS 5V AVR
IC801	**0N3131R**	**INT CKT**
IC803	**STR58041A**	**INT CKT**
IC1801	M65617SP	PIP CONTROLLER CT–32G22V CT–32G22CV
IC2201	AN5819K	INT CKT
IC2301	AN7147N	INT CKT
IC2340	M5222L	INT CKT
IC2402	TC4066BP	INT CKT
IC2451	AN5285K	INT CKT
IC3001	M52055P	INT CKT CT–32G22V CT–32G22CV
IC3031	M52055P	INT CKT CT–32G22V CT–32G22CV
IC4402	M52055P	INT CKT CT–32G22V CT–32G22CV
		COILS
L001	TSKA074	FERRITE BEAD
L002	TLTACT390K	COIL, PEAKING 39UH
L003	TLUABTA2R2K	COIL, PEAKING 2.2UH
L004	TLUABTA2R2K	COIL, PEAKING 2.2UH
L006	TSKA072	FERRITE BEAD
L008	TLUABTA470K	COIL, PEAKING 47UH
L103	TLTACT120J	COIL, PEAKING 12UH
L105	EIV7EN053B	COIL, VCO
L106	TLTACT180J	COIL, PEAKING 18UH
L351	TLUABTA101K	COIL, PEAKING 100UH CT–32G22V CT–32G22CV
L351	TLUABTA151K	COIL, PEAKING 150UH CT–32G12V CT–32G12CV
L551	**TLH6663P**	**COIL, LINEARITY**
L554	TSKA072	FERRITE BEAD CT–32G22V CT–32G22CV
L555	TSKA072	FERRITE BEAD CT–32G22V CT–32G22CV
L556	TSKA072	FERRITE BEAD
L602	TLTACT120J	COIL, PEAKING 12UH CT–32G12V CT–32G12CV
L751	ELC18B301L	COIL, CHOKE
L752	EXCELDR35	FERRITE BEAD
L801	**ELF20N020A**	**COIL, 2UH**
L803	**ELF17N007A**	**LINE FILTER**
L804	TSKA076	FERRITE BEAD
L805	TSKA076	FERRITE BEAD
L1801	TLTACT1R5K	COIL, PEAKING CT–32G22V CT–32G22CV
L1803	TLTACT2R2K	COIL, PEAKING 2.2UH CT–32G22V CT–32G22CV
L1804	TLTACT150J	COIL, PEAKING 15UH CT–32G22V CT–32G22CV
L1806	TLTACT1R0K	COIL, PEAKING 1UH CT–32G22V CT–32G22CV
L1807	TLTACT1R0K	COIL, PEAKING 1UH CT–32G22V CT–32G22CV
L1808	EXCELDR25	COIL CT–32G22V CT–32G22CV
L2201	TLTACT102J	COIL, PEAKING 1000UH
L2202	TLTACT471J	COIL, PEAKING 470UH
L3201	EFDEN645B35B	DELAY LINE CT–32G22V CT–32G22CV

PARTS LIST

REPLACEMENT PARTS LIST

(Models: CT–32G12V/CV & CT–32G22V/CV)

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REF. NO.	PART NO.	DESCRIPTION
L3202	EQK7ES731B	COIL, 730UH CT–32G22V CT–32G22CV
L3203	TLTACT180K	COIL, PEAKING 18UH CT–32G22V CT–32G22CV
L4301	TLTACT2R2K	COIL, PEAKING 2.2UH CT–32G22V CT–32G22CV
		TRANSISTORS
Q001	MSD601–RT1	TRANSISTOR
Q002	JC501PQ	TRANSISTOR
Q003	MSB709–RT1	TRANSISTOR
Q004	MSB709–RT1	TRANSISTOR
Q302	MSD601–RT1	TRANSISTOR
Q303	MSB709–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q304	MSD601–RT1	TRANSISTOR
Q305	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q306	MSB709–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q307	MSB709–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q351	2SC3063	TRANSISTOR
Q352	2SC3063	TRANSISTOR
Q353	2SC3063	TRANSISTOR
Q451	MSD601–RT1	TRANSISTOR
Q452	MSD601–RT1	TRANSISTOR
Q501	**2SC4212H**	**TRANSISTOR**
Q551	**BU2508DF**	**TRANSISTOR**
Q751	JC501PQ	TRANSISTOR
Q752	JA101PQ	TRANSISTOR
Q753	2SD1266	TRANSISTOR
Q801	2SC1685RS	TRANSISTOR
Q802	2SC1384RS	TRANSISTOR
Q804	2SA1767Q	TRANSISTOR
Q1801	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q1802	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q1803	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q1804	MSB709–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q1805	MSB709–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q2302	MSB709–RT1	TRANSISTOR
Q2303	MSD601–RT1	TRANSISTOR
Q2305	MSB709–RT1	TRANSISTOR
Q2401	JC501PQ	TRANSISTOR CT–32G12V CT–32G12CV
Q2401	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q2402	JC501PQ	TRANSISTOR CT–32G12V CT–32G12CV
Q2402	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q2407	JC501PQ	TRANSISTOR CT–32G12V CT–32G12CV
Q2407	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q2408	JC501PQ	TRANSISTOR CT–32G12V CT–32G12CV
Q2408	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q3001	MSD601–RT1	TRANSISTOR
Q3011	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q3012	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q3013	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q3014	MSB709–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q3201	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q3202	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q3203	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q3204	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q3205	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q4309	MSB709–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q4310	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q4311	MSB709–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q4312	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q4313	MSD601–RT1	TRANSISTOR CT–32G22V CT–32G22CV
Q4315	2SC1384Q	TRANSISTOR CT–32G22V CT–32G22CV
		RELAYS
RL801	**TSEH8007**	**RELAY**
		RESISTORS
R002	ERJ6GEYJ182	RES,M 1.8K–J–1/10
R003	ERJ6GEYJ562	RES,M 5.6K–J–1/10
R004	ERDS1TJ181	RES,C 180–J–1/2
R005	ERDS2TJ101	RES,C 100–J–1/4
R006	ERJ6GEYJ391	RES,M 390–J–1/10
R007	ERJ6GEYJ561	RES,M 560–J–1/10
R008	ERJ6GEYJ562	RES,M 5.6K–J–1/10
R010	ERJ6GEYJ154	RES,M 150K–J–1/10
R011	ERJ6GEYJ684	RES,M 680K–J–1/10
R012	ERJ6GEYJ473	RES,M 47K–J–1/10
R016	ERJ6GEYJ472	RES,M 4.7K–J–1/10
R017	ERDS2TJ472	RES,C 4.7K–J–1/4
R020	ERJ6GEYJ474	RES,M 470K–J–1/10
R021	ERJ6GEYJ101	RES,M 100–J–1/10

REPLACEMENT PARTS LIST

(Models: CT–32G12V/CV & CT–32G22V/CV)

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REF. NO.	PART NO.	DESCRIPTION
R022	ERJ6GEYJ101	RES,M 100–J–1/10
R023	ERJ6GEYJ102	RES,M 1K–J–1/10
R025	ERJ6GEYJ103	RES,M 10K–J–1/10
R027	ERDS2TJ103	RES,C 10K–J–1/4
R028	ERJ6GEYJ103	RES,M 10K–J–1/10
R029	ERJ6GEYJ133	RES,M 13K–J–1/10 CT–32G22V CT–32G22CV
R029	ERJ6GEYJ223	RES,M 22K–J–1/10 CT–32G12V CT–32G12CV
R030	ERJ6GEYJ102	RES,M 1K–J–1/10
R031	ERJ6GEYJ471	RES,M 470–J–1/10
R032	ERJ6ENF1002	RES,M 10K–F–1/10
R033	ERJ6GEYJ222	RES,M 2.2K–J–1/10
R034	ERJ6GEYJ222	RES,M 2.2K–J–1/10
R035	ERJ6GEYJ332	RES,M 3.3K–J–1/10
R036	ERJ6GEYJ562	RES,M 5.6K–J–1/10
R037	ERJ6GEYJ103	RES,M 10K–J–1/10
R038	ERJ6GEYJ223	RES,M 22K–J–1/10
R039	ERJ6GEYJ102	RES,M 1K–J–1/10
R040	ERJ6GEYJ223	RES,M 22K–J–1/10
R041	ERDS2TJ471	RES,C 470–J–1/4 CT–32G22V CT–32G22CV
R042	ERJ6GEYJ223	RES,M 22K–J–1/10 CT–32G22V CT–32G22CV
R043	ERJ6GEYJ223	RES,M 22K–J–1/10 CT–32G22V CT–32G22CV
R044	ERJ6GEYJ471	RES,M 470–J–1/10 CT–32G22V CT–32G22CV
R045	ERDS2TJ102	RES,C 1K–J–1/4
R048	ERJ6GEYJ221	RES,M 220–J–1/10
R049	ERJ6GEYJ221	RES,M 220–J–1/10
R050	ERJ6GEYJ223	RES,M 22K–J–1/10 CT–32G22V CT–32G22CV
R051	ERDS2TJ471	RES,C 470–J–1/4 CT–32G22V CT–32G22CV
R052	ERJ6GEYJ103	RES,M 10K–J–1/10
R055	ERJ6GEYJ103	RES,M 10K–J–1/10
R057	ERJ6GEYJ103	RES,M 10K–J–1/10
R060	ERJ6GEYJ102	RES,M 1K–J–1/10
R065	ERJ6GEYJ222	RES,M 2.2K–J–1/10
R066	ERJ6GEYJ222	RES,M 2.2K–J–1/10
R067	ERJ6GEYJ222	RES,M 2.2K–J–1/10
R068	ERJ6GEYJ222	RES,M 2.2K–J–1/10
R101	ERJ6GEYJ750	RES,M 75–J–1/10
R102	ERJ6GEYJ683	RES,M 68K–J–1/10
R103	ERJ6GEYJ183	RES,M 18K–J–1/10
R104	ERJ6GEYJ681	RES,M 680–J–1/10
R105	ERJ6GEYJ681	RES,M 680–J–1/10
R107	ERJ6GEYJ471	RES,M 470–J–1/10
R108	ERJ6GEYJ222	RES,M 2.2K–J–1/10
R152	ERDS2TJ183	RES,C 18K–J–1/4
R153	ERJ6GEYJ223	RES,M 22K–J–1/10
R154	ERDS2TJ393	RES,C 39K–J–1/4
R201	ERJ6GEYJ471	RES,M 470–J–1/10
R202	ERJ6GEYJ682	RES,M 6.8K–J–1/10
R203	ERJ6GEYJ562	RES,M 5.6K–J–1/10
R303	ERJ6GEYJ682	RES,M 6.8K–J–1/10
R304	ERJ6GEYJ332	RES,M 3.3K–J–1/10
R305	ER0S2CKF3001	RES,M 3K–F–1/4
R306	ERJ6ENF1601	RES,M 1.6K–F–1/10W
R308	ERDS2TJ102	RES,C 1K–J–1/4
R309	ERJ6GEYJ683	RES,M 68K–J–1/10
R310	ERJ6GEYJ273	RES,M 27K–J–1/10
R311	ERJ6GEYJ185	RES,M 1.8MEG–J–1/10W
R313	ERJ6GEYJ471	RES,M 470–J–1/10 CT–32G22V CT–32G22CV
R314	ERDS2TJ471	RES,C 470–J–1/4 CT–32G22V CT–32G22CV
R317	ERJ6GEYJ684	RES,M 680K–J–1/10
R319	ERJ6GEYJ122	RES,M 1.2K–J–1/10
R320	ERJ6GEYJ102	RES,M 1K–J–1/10
R324	ERJ6GEYJ222	RES,M 2.2K–J–1/10 CT–32G22V CT–32G22CV
R325	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R326	ERJ6GEYJ332	RES,M 3.3K–J–1/10 CT–32G22V CT–32G22CV
R327	ERJ6GEYJ392	RES,M 3.9K–J–1/10 CT–32G22V CT–32G22CV
R328	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R335	ERJ6GEYJ471	RES,M 470–J–1/10 CT–32G22V CT–32G22CV
R351	ERG2FJ123H	RES,M 12K–J–2W
R352	ERG2FJ123H	RES,M 12K–J–2W
R353	ERG2FJ123H	RES,M 12K–J–2W
R354	ERDS1TJ272	RES,C 2.7K–J–1/2
R355	ERDS1TJ272	RES,C 2.7K–J–1/2
R356	ERDS1TJ272	RES,C 2.7K–J–1/2
R357	ERDS2TJ241	RES,C 240–J–1/4
R358	ERDS2TJ241	RES,C 240–J–1/4
R359	ERDS2TJ241	RES,C 240–J–1/4
R360	ERDS2TJ751	RES,C 750–J–1/4
R361	ERDS2TJ751	RES,C 750–J–1/4
R362	ERDS2TJ751	RES,C 750–J–1/4
R363	ERDS2TJ101	RES,C 100–J–1/4
R364	ERDS2TJ101	RES,C 100–J–1/4
R365	ERDS2TJ101	RES,C 100–J–1/4
R401	ERJ6GEYJ102	RES,M 1K–J–1/10
R451	ERDS1FJ1R2	RES,C 1.2–J–1/2
R454	ERJ6GEYJ393	RES,M 39K–J–1/10
R455	ERJ6GEYJ183	RES,M 18K–J–1/10
R456	ERJ6GEYJ223	RES,M 22K–J–1/10
R457	ERJ6GEYJ332	RES,M 3.3K–J–1/10
R458	ERJ6GEYJ333	RES,M 33K–J–1/10
R459	ERJ6GEYJ683	RES,M 68K–J–1/10
R460	ERDS2TJ102	RES,C 1K–J–1/4
R462	ERJ6GEYJ473	RES,M 47K–J–1/10
R463	ERJ6GEYJ473	RES,M 47K–J–1/10
R464	ERDS1FJ1R5	RES,C 1.5–J–1/2
R465	ERDS2TJ103	RES,C 10K–J–1/4
R466	ERJ6GEYJ103	RES,M 10K–J–1/10

REPLACEMENT PARTS LIST

(Models: CT–32G12V/CV & CT–32G22V/CV)

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REF. NO.	PART NO.	DESCRIPTION
R467	ERJ6GEYJ104	RES,M 100K–J–1/10
R468	ERJ6GEYJ101	RES,M 100–J–1/10
R469	ERJ6GEYJ220	RES,M 22–J–1/10
R471	ERJ6GEYJ223	RES,M 22K–J–1/10
R501	ERJ6GEYJ102	RES,M 1K–J–1/10
R502	ERDS2TJ562	RES,C 5.6K–J–1/4
R503	ERJ6GEYJ822	RES,M 8.2K–J–1/10
R504	ERJ6GEYJ561	RES,M 560–J–1/10
R505	ERJ6GEYJ682	RES,M 6.8K–J–1/10
R506	ERJ6GEYJ182	RES,M 1.8K–J–1/10
R507	ERJ6GEYJ392	RES,M 3.9K–J–1/10
R508	ERJ6GEYJ562	RES,M 5.6K–J–1/10
R509	ERDS2TJ331	RES,C 330–J–1/4
R510	**ERG3FJ332H**	**RES,M 2.3K–J–3W**
R511	**ERG3FJ272H**	**RES,M 2.7K–J–3W**
R512	ERG2FJ392H	RES,M 3.9K–J–2W
R513	ERJ6GEYJ333	RES,M 33K–J–1/10
R515	ERJ6GEYJ562	RES,M 5.6K–J–1/10 CT–32G22V CT–32G22CV
R531	**ERD25FJ470**	**RES,C 47–J–1/4**
R532	**ERJ6ENF5362**	**RES,M 53.6K–F–1/10W**
R533	**ERJ6ENF1692**	**RES,M 16.9K–F–1/10**
R535	ERJ6GEYJ684	RES,M 680K–J–1/10
R536	ERJ6GEYJ223	RES,M 22K–J–1/10
R537	ERJ6GEYJ473	RES,M 47K–J–1/10
R551	**ERDS1FJ1R0**	**RES,C 1.0–J–1/2**
R552	**ERDS1FJ1R0**	**RES,C 1.0–J–1/2**
R554	ERG3FJ270H	RES,M 27–J–3W CT–32G22V CT–32G22CV
R556	ERDS2TJ272	RES,C 2.7K–J–1/4
R557	ERDS2TJ103	RES,C 10K–J–1/4
R558	**ERQ2CJP1R8**	**RES,F 1.8–J–2W**
R559	ERG2FJ683H	RES,M 12K–J–2W
R560	ERG2FJ122H	RES,M 12K–J–2W
R561	ERG2FJ102H	RES,M 1K–J–2W
R563	ERDS2TJ683	RES,C 68K–J–1/4
R564	ERDS2TJ563	RES,C 56K–J–1/4
R565	ERDS2TJ103	RES,C 10K–J–1/4
R566	**ERDS1FJ1R0**	**RES,C 1.0–J–1/2** **CT–32G22V CT–32G22CV**
R570	ERDS1FJ560	RES,C 56–J–1/2 CT–32G12V CT–32G12CV
R602	ERJ6GEYJ331	RES,M 330–J–1/10
R603	ERJ6GEYJ331	RES,M 330–J–1/10
R604	ERJ6GEYJ331	RES,M 330–J–1/10
R614	ERJ6GEYJ332	RES,M 3.3K–J–1/10
R752	ERDS2TJ333	RES,C 33K–J–1/4
R753	ERDS2TJ103	RES,C 10K–J–1/4
R754	ERG3FJ562	RES,M 5.6K–J–3W
R755	ERDS2TJ563	RES,C 56K–J–1/4
R756	ERDS2TJ103	RES,C 10K–J–1/4
R757	ERDS2TJ224	RES,C 220K–J–1/4
R758	ERDS2TJ223	RES,C 22K–J–1/4
R759	ERDS2TJ222	RES,C 2.2K–J–1/4
R760	EVND8AA03B53	CONTROL 5K
R761	EVND8AA03B14	CONTROL 10K
R762	ERDS2TJ182	RES,C 1.8K–J–1/4
R763	ERDS2TJ183	RES,C 18K–J–1/4
R764	ERDS2TJ154	RES,C 150K–J–1/4
R765	ERDS2TJ272	RES,C 2.7K–J–1/4
R766	ERDS2TJ362	RES,C 3.6K–J–1/4
R767	ERDS2TJ222	RES,C 2.2K–J–1/4
R768	ERQ2CJP100	RES,F 10–J–2W
R801	**ERF7ZK1R5**	**RES,W 1.5–K–7W**
R804	ERW12PK1R8	RES,W 1.8–K–1/2W
R805	ERDS2TJ274	RES,C 270K–J–1/4
R806	ERDS2TJ274	RES,C 270K–J–1/4
R808	ERDS1FJ1R0	RES,C 1.0–J–1/2
R809	ERDS1FJ1R0	RES,C 1.0–J–1/2
R810	ERDS1FJ272	RES,C 2.7K–J–1/2
R812	ERDS1TJ183	RES,C 18K–J–1/2
R813	ERJ6GEYJ562	RES,M 5.6K–J–1/10
R815	**ERC12ZGM825**	**RES,S 8.2MEG–M–1/2**
R818	ERQ12HJR56	RES,F .56–J–1/2 CT–32G12V CT–32G22V
R819	**ERDS1FJ1R0**	**RES,C 1.0–J–1/2** **CT–32G12CV CT–32G22CV**
R820	ERDS2TJ153	RES,C 15K–J–1/4
R821	ERDS2TJ392	RES,C 3.9K–J–1/4
R822	ERD50FJ474	RES,C 470K–J–1/2W
R823	ERDS2TJ222	RES,C 2.2K–J–1/4
R824	ERG3FJ390	RES,M 39–J–3W
R825	ERDS2TJ102	RES,C 1K–J–1/4
R826	**ERF2AKR22**	**RES,W .22–K–2W**
R827	ERDS1FJ561	RES,C 560–J–1/2
R828	ERG3FJ470	RES,M 47–J–3W
R829	ERQ14AJ6R8	RES,F 6.8–J–1/4
R1801	ERJ6GEYJ301	RES,M 300–J–1/10 CT–32G22V CT–32G22CV
R1802	ERJ6GEYJ104	RES,M 100K–J–1/10 CT–32G22V CT–32G22CV
R1803	ERJ6GEYJ474	RES,M 470K–J–1/10 CT–32G22V CT–32G22CV
R1804	ERJ6GEYJ202	RES,M 2K–J–1/10 CT–32G22V CT–32G22CV
R1805	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R1807	ERJ6GEYJ103	RES,M 10K–J–1/10 CT–32G22V CT–32G22CV
R1808	ERJ6GEYJ103	RES,M 10K–J–1/10 CT–32G22V CT–32G22CV
R1809	ERJ6GEYJ473	RES,M 47K–J–1/10 CT–32G22V CT–32G22CV
R1810	ERJ6GEYJ103	RES,M 10K–J–1/10 CT–32G22V CT–32G22CV
R1811	ERJ6GEYJ682	RES,M 6.8K–J–1/10 CT–32G22V CT–32G22CV
R1812	ERJ6GEYJ153	RES,M 15K–J–1/10 CT–32G22V CT–32G22CV
R1813	ERJ6GEYJ153	RES,M 15K–J–1/10 CT–32G22V CT–32G22CV

REPLACEMENT PARTS LIST

(Models: CT–32G12V/CV & CT–32G22V/CV)

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REF. NO.	PART NO.	DESCRIPTION
R1814	ERJ6GEYJ361	RES,M 360–J–1/10 CT–32G22V CT–32G22CV
R1815	ERJ6GEYJ471	RES,M 470–J–1/10 CT–32G22V CT–32G22CV
R1818	ERJ6GEYJ101	RES,M 100–J–1/10 CT–32G22V CT–32G22CV
R1819	ERJ6GEYJ101	RES,M 100–J–1/10 CT–32G22V CT–32G22CV
R1822	ERJ6GEYJ682	RES,M 6.8K–J–1/10 CT–32G22V CT–32G22CV
R1823	ERJ6GEYJ473	RES,M 47K–J–1/10 CT–32G22V CT–32G22CV
R1825	ERJ6GEYJ471	RES,M 470–J–1/10 CT–32G22V CT–32G22CV
R1827	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R1828	ERJ6GEYJ471	RES,M 470–J–1/10 CT–32G22V CT–32G22CV
R1830	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R1856	ERJ6GEYJ153	RES,M 15K–J–1/10 CT–32G22V CT–32G22CV
R2201	ERJ6GEYJ472	RES,M 4.7K–J–1/10
R2202	ERJ6GEYJ153	RES,M 15K–J–1/10
R2203	ERJ6GEYJ104	RES,M 100K–J–1/10
R2204	ERJ6GEYJ473	RES,M 47K–J–1/10
R2205	ERJ6GEYJ154	RES,M 150K–J–1/10
R2206	ERJ6GEYJ102	RES,M 1K–J–1/10
R2207	ERJ6GEYJ102	RES,M 1K–J–1/10
R2208	ERJ6ENF9102	RES,M 91K–F–1/10
R2212	ERJ6GEYJ682	RES,M 6.8K–J–1/10
R2221	ERJ6GEYJ101	RES,M 100–J–1/10
R2301	ERQ2CJP1R8	RES,F 1.8–J–2W CT–32G12V CT–32G22V
R2301	ERQ2CJP8R2	RES,F 8.2–J–2W CT–32G12CV CT–32G22CV
R2302	ERJ6GEYJ182	RES,M 1.8K–J–1/10
R2303	ERJ6GEYJ103	RES,M 10K–J–1/10
R2305	ERD25FJ2R2	RES,C 2.2–J–1/4
R2306	ERD25FJ2R2	RES,C 2.2–J–1/4
R2307	ERJ6GEYJ392	RES,M 3.9K–J–1/10
R2309	ERJ6GEYJ103	RES,M 10K–J–1/10
R2310	ERJ6GEYJ181	RES,M 180–J–1/10
R2315	ERJ6GEYJ101	RES,M 100–J–1/10
R2316	ERJ6GEYJ472	RES,M 4.7K–J–1/10
R2319	ERJ6GEYJ223	RES,M 22K–J–1/10
R2321	ERJ6GEYJ182	RES,M 1.8K–J–1/10
R2322	ERJ6GEYJ103	RES,M 10K–J–1/10
R2323	ERDS2TJ682	RES,C 6.8K–J–1/4
R2324	ERJ6GEYJ331	RES,M 330–J–1/10
R2325	ERJ6GEYJ183	RES,M 18K–J–1/10 CT–32G22V CT–32G22CV
R2326	ERJ6GEYJ103	RES,M 10K–J–1/10
R2334	ERJ6GEYJ183	RES,M 18K–J–1/10 CT–32G22V CT–32G22CV
R2351	ERDS2TJ222	RES,C 2.2K–J–1/4 CT–32G12V CT–32G12CV
R2352	ERDS2TJ183	RES,C 18K–J–1/4 CT–32G12V CT–32G12CV
R2353	ERDS2TJ222	RES,C 2.2K–J–1/4 CT–32G12V CT–32G12CV
R2354	ERDS2TJ302	RES,C 3K–J–1/4 CT–32G12V CT–32G12CV
R2354	ERJ6GEYJ302	RES,M 3K–J–1/10 CT–32G22V CT–32G22CV
R2355	ERDS2TJ102	RES,C 1K–J–1/4 CT–32G12V CT–32G12CV
R2355	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R2356	ERDS2TJ183	RES,C 18K–J–1/4 CT–32G12V CT–32G12CV
R2357	ERJ6GEYJ392	RES,M 3.9K–J–1/10
R2358	ERDS2TJ302	RES,C 3K–J–1/4 CT–32G12V CT–32G12CV
R2358	ERJ6GEYJ302	RES,M 3K–J–1/10 CT–32G22V CT–32G22CV
R2359	ERDS2TJ102	RES,C 1K–J–1/4 CT–32G12V CT–32G12CV
R2359	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R2360	ERDS2TJ104	RES,C 100K–J–1/4 CT–32G12V CT–32G12CV
R2360	ERJ6GEYJ104	RES,M 100K–J–1/10 CT–32G22V CT–32G22CV
R2361	ERDS2TJ752	RES,C 7.5K–J–1/4 CT–32G12V CT–32G12CV
R2361	ERJ6GEYJ752	RES,M 7.5K–J–1/10 CT–32G22V CT–32G22CV
R2362	ERDS2TJ104	RES,C 100K–J–1/4 CT–32G12V CT–32G12CV
R2362	ERJ6GEYJ104	RES,M 100K–J–1/10 CT–32G22V CT–32G22CV
R2363	ERDS2TJ304	RES,C 300K–J–1/4 CT–32G12V CT–32G12CV
R2363	ERJ6GEYJ304	RES,M 300K–J–1/10 CT–32G22V CT–32G22CV
R2364	ERDS2TJ104	RES,C 100K–J–1/4 CT–32G12V CT–32G12CV
R2364	ERJ6GEYJ104	RES,M 100K–J–1/10 CT–32G22V CT–32G22CV
R2365	ERDS2TJ104	RES,C 100K–J–1/4 CT–32G12V CT–32G12CV
R2365	ERJ6GEYJ104	RES,M 100K–J–1/10 CT–32G22V CT–32G22CV
R2366	ERJ6GEYJ222	RES,M 2.2K–J–1/10 CT–32G22V CT–32G22CV
R2367	ERJ6GEYJ222	RES,M 2.2K–J–1/10 CT–32G22V CT–32G22CV
R2367	ER0S2CKF1203	RES,M 120K–F–1/4 CT–32G12V CT–32G12CV

REPLACEMENT PARTS LIST

(Models: CT–32G12V/CV & CT–32G22V/CV)

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REF. NO.	PART NO.	DESCRIPTION
R2368	ER0S2CKF1003	RES,M 100K–F–1/4 CT–32G12V CT–32G12CV
R2371	ERJ6ENF1203	RES,M 120K–F–1/10 CT–32G22V CT–32G22CV
R2372	ERJ6ENF1003	RES,M 100K–F–1/10 CT–32G22V CT–32G22CV
R2411	ERDS2TJ223	RES,C 22K–J–1/4 CT–32G12V CT–32G12CV
R2411	ERJ6GEYJ103	RES,M 10K–J–1/10 CT–32G22V CT–32G22CV
R2412	ERDS2TJ104	RES,C 100K–J–1/4 CT–32G12V CT–32G12CV
R2412	ERJ6GEYJ104	RES,M 100K–J–1/10 CT–32G22V CT–32G22CV
R2415	ERDS2TJ473	RES,C 47K–J–1/4 CT–32G12V CT–32G12CV
R2415	ERJ6GEYJ473	RES,M 47K–J–1/10 CT–32G22V CT–32G22CV
R2416	ERDS2TJ104	RES,C 100K–J–1/4 CT–32G12V CT–32G12CV
R2416	ERJ6GEYJ104	RES,M 100K–J–1/10 CT–32G22V CT–32G22CV
R2451	ERJ6GEYJ225	RES,M 2.2MEG–J–1/10
R2455	ERJ6GEYJ243	RES,M 24K–J–1/10
R2456	ERJ6GEYJ223	RES,M 22K–J–1/10
R3001	ERJ6GEYJ473	RES,M 47K–J–1/10
R3002	ERJ6GEYJ104	RES,M 100K–J–1/10
R3003	ERJ6GEYJ104	RES,M 100K–J–1/10
R3011	ERDS2TJ750	RES,C 75–J–1/4 CT–32G12V CT–32G12CV
R3011	ERJ6GEYJ680	RES,M 68–J–1/10 CT–32G22V CT–32G22CV
R3012	ERJ6GEYJ750	RES,M 75–J–1/10 CT–32G22V CT–32G22CV
R3013	ERDS2TJ184	RES,C 180K–J–1/4 CT–32G12V CT–32G12CV
R3013	ERJ6GEYJ184	RES,M 180K–J–1/10 CT–32G22V CT–32G22CV
R3014	ERJ6GEYJ184	RES,M 180K–J–1/10 CT–32G22V CT–32G22CV
R3015	ERDS2TJ184	RES,C 180K–J–1/4 CT–32G12V CT–32G12CV
R3015	ERJ6GEYJ750	RES,M 75–J–1/10 CT–32G22V CT–32G22CV
R3016	ERJ6GEYJ184	RES,M 180K–J–1/10 CT–32G22V CT–32G22CV
R3017	ERJ6GEYJ750	RES,M 75–J–1/10 CT–32G22V CT–32G22CV
R3019	ERJ6GEYJ184	RES,M 180K–J–1/10 CT–32G22V CT–32G22CV
R3021	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R3022	ERJ6GEYJ101	RES,M 100–J–1/10 CT–32G22V CT–32G22CV
R3024	ERJ6GEYJ390	RES,M 39–J–1/10 CT–32G22V CT–32G22CV
R3025	ERJ6GEYJ683	RES,M 68K–J–1/10 CT–32G22V CT–32G22CV
R3026	ERJ6GEYJ101	RES,M 100–J–1/10 CT–32G22V CT–32G22CV
R3028	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R3031	ERJ6GEYJ101	RES,M 100–J–1/10 CT–32G22V CT–32G22CV
R3032	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R3034	ERJ6GEYJ683	RES,M 68K–J–1/10 CT–32G22V CT–32G22CV
R3035	ERJ6GEYJ471	RES,M 470–J–1/10 CT–32G22V CT–32G22CV
R3037	ERJ6GEYJ683	RES,M 68K–J–1/10 CT–32G22V CT–32G22CV
R3038	ERJ6GEYJ103	RES,M 10K–J–1/10 CT–32G22V CT–32G22CV
R3039	ERJ6GEYJ104	RES,M 100K–J–1/10 CT–32G22V CT–32G22CV
R3041	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R3042	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R3071	ERJ6GEYJ223	RES,M 22K–J–1/10 CT–32G22V CT–32G22CV
R3072	ERJ6GEYJ683	RES,M 68K–J–1/10 CT–32G22V CT–32G22CV
R3073	ERJ6GEYJ683	RES,M 68K–J–1/10 CT–32G22V CT–32G22CV
R3074	ERJ6GEYJ223	RES,M 22K–J–1/10 CT–32G22V CT–32G22CV
R3075	ERJ6GEYJ101	RES,M 100–J–1/10 CT–32G22V CT–32G22CV
R3076	ERJ6GEYJ471	RES,M 470–J–1/10 CT–32G22V CT–32G22CV
R3077	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R3078	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R3079	ERJ6GEYJ471	RES,M 470–J–1/10 CT–32G22V CT–32G22CV
R3080	ERJ6GEYJ152	RES,M 1.5K–J–1/10 CT–32G22V CT–32G22CV
R3201	ERJ6GEYJ103	RES,M 10K–J–1/10 CT–32G22V CT–32G22CV
R3202	ERJ6GEYJ223	RES,M 22K–J–1/10 CT–32G22V CT–32G22CV
R3203	ERJ6GEYJ101	RES,M 100–J–1/10 CT–32G22V CT–32G22CV
R3204	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R3205	ERJ6GEYJ272	RES,M 2.7K–J–1/10 CT–32G22V CT–32G22CV
R3206	ERJ6GEYJ682	RES,M 6.8K–J–1/10 CT–32G22V CT–32G22CV

REPLACEMENT PARTS LIST

(Models: CT–32G12V/CV & CT–32G22V/CV)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION
R3207	ERJ6GEYJ103	RES,M 10K–J–1/10 CT–32G22V CT–32G22CV
R3208	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R3209	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R3210	ERJ6GEYJ103	RES,M 10K–J–1/10 CT–32G22V CT–32G22CV
R3211	ERJ6GEYJ181	RES,M 180–J–1/10 CT–32G22V CT–32G22CV
R3212	ERJ6GEYJ331	RES,M 330–J–1/10 CT–32G22V CT–32G22CV
R3213	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R3214	ERJ6GEYJ331	RES,M 330–J–1/10 CT–32G22V CT–32G22CV
R3215	EVND8AA03B22	CONTROL 200 OHM CT–32G22V CT–32G22CV
R3217	ERJ6GEYJ331	RES,M 330–J–1/10 CT–32G22V CT–32G22CV
R3218	ERJ6GEYJ471	RES,M 470–J–1/10 CT–32G22V CT–32G22CV
R3220	ERJ6GEYJ331	RES,M 330–J–1/10 CT–32G22V CT–32G22CV
R3221	ERJ6GEYJ122	RES,M 1.2K–J–1/10 CT–32G22V CT–32G22CV
R3222	ERJ6GEYJ471	RES,M 470–J–1/10 CT–32G22V CT–32G22CV
R3223	ERJ6GEYJ471	RES,M 470–J–1/10 CT–32G22V CT–32G22CV
R3224	ERJ6GEYJ471	RES,M 470–J–1/10 CT–32G22V CT–32G22CV
R3229	ERJ6GEYJ152	RES,M 1.5K–J–1/10 CT–32G22V CT–32G22CV
R4310	ERJ6GEYJ103	RES,M 10K–J–1/10 CT–32G22V CT–32G22CV
R4311	ERJ6GEYJ103	RES,M 10K–J–1/10 CT–32G22V CT–32G22CV
R4326	ERJ6GEYJ471	RES,M 470–J–1/10 CT–32G22V CT–32G22CV
R4327	ERJ6GEYJ331	RES,M 330–J–1/10 CT–32G22V CT–32G22CV
R4328	ERJ6GEYJ560	RES,M 56–J–1/10 CT–32G22V CT–32G22CV
R4329	ERJ6GEYJ182	RES,M 1.8K–J–1/10 CT–32G22V CT–32G22CV
R4330	ERJ6GEYJ561	RES,M 560–J–1/10 CT–32G22V CT–32G22CV
R4331	ERJ6GEYJ471	RES,M 470–J–1/10 CT–32G22V CT–32G22CV
R4332	ERJ6GEYJ393	RES,M 39K–J–1/10 CT–32G22V CT–32G22CV
R4333	ERJ6GEYJ304	RES,M 300K–J–1/10 CT–32G22V CT–32G22CV
R4334	ERJ6GEYJ152	RES,M 1.5K–J–1/10 CT–32G22V CT–32G22CV
R4336	ERJ6GEYJ680	RES,M 68–J–1/10 CT–32G22V CT–32G22CV
R4338	ERJ6GEYJ222	RES,M 2.2K–J–1/10 CT–32G22V CT–32G22CV
R4339	ERJ6GEYJ102	RES,M 1K–J–1/10 CT–32G22V CT–32G22CV
R4340	ERJ6GEYJ471	RES,M 470–J–1/10 CT–32G22V CT–32G22CV
R4341	ERJ6GEYJ222	RES,M 2.2K–J–1/10 CT–32G22V CT–32G22CV
R4342	ERJ6GEYJ223	RES,M 22K–J–1/10 CT–32G22V CT–32G22CV
R4344	ERJ6GEYJ682	RES,M 6.8K–J–1/10 CT–32G22V CT–32G22CV
R4345	ERJ6GEYJ103	RES,M 10K–J–1/10 CT–32G22V CT–32G22CV
R4417	ERJ6GEYJ101	RES,M 100–J–1/10 CT–32G22V CT–32G22CV
R4418	ERJ6GEYJ101	RES,M 100–J–1/10 CT–32G22V CT–32G22CV
R4427	ERJ6GEYJ223	RES,M 22K–J–1/10 CT–32G22V CT–32G22CV
J13	ERDS2TJ102	RES,C 1K–J–1/4 CT–32G12V CT–32G12CV
J16	ERDS2TJ102	RES,C 1K–J–1/4 CT–32G12V CT–32G12CV
J224	ERDS2TJ390	RES,C 39–J–1/4 CT–32G12V CT–32G12CV
		SWITCHES
S001	EVQPF106K	SWITCH
S002	EVQPF106K	SWITCH
S003	EVQPF106K	SWITCH
S004	EVQPF106K	SWITCH
S005	EVQPF106K	SWITCH
S008	EVQPF106K	SWITCH
S009	EVQPF106K	SWITCH
		TRANSFORMERS
T001	**TLP16297**	**TRANSFORMER, POWER SUPPLY**
T501	**TLH15452**	**TRANSFORMER, HORIZONTAL DRIVER**
T502	**ETE19Z30AY**	**TRANSFORMER, HORIZONTAL COUPLING**
T551	**KFT5AB106F**	**TRANSFORMER**
T751	**ETE19Z30AY**	**TRANSFORMER, HORIZONTAL COUPLING**
T801	**ETS29AK1N6NC**	**TRANSFORMER**
		CRYSTALS/FILTERS
X001	TSS2080MX	CRYSTAL, 12 MHZ CLOCK
X101	M1969M	SAW FILTER
X102	EFCWS4504AB	FILTER 4.5MHZ
X201	EFCS4R5MS5W	FILTER 4.5MHZ BANDPASS
X501	TAFCSB503F38	CRYSTAL, CLOCK
X601	TS816M32	CRYSTAL 3.58MHZ OSCILLATOR
X1801	TSSA050	CRYSTAL OSCILLATOR CT–32G22V CT–32G22CV

REPLACEMENT PARTS LIST

(Models: CT–32G12V/CV & CT–32G22V/CV)

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION
		OTHERS
M001	**M80JUA061X**	**CRT 32"**
TNR001	**ENV56D18G3**	**TUNER**
M002	TAS2AA0004	SPEAKER 8–OHM 7W CT–32G12V CT–32G22V
M003	TAS2AA0005	SPEAKER 16–OHM 1.5W CT–32G12CV CT–32G22CV
M004	TBM2AA0021	BADGE, PANANSONIC
M005	TBX2AA1001AG	BUTTON, 7–KEY
JK351	**TJSC00300**	**CRT SOCKET**
M006	TLC2047–2	MAGNET,RINGS:PURITY & STATIC CONV.
DY	**TLYA007**	**YOKE, DEFLECTION**
M007	TMM2A30702	WEDGE, YOKE
M008	TMW2A97121	STRAIN RELIEF: AC LINE CORD
M009	TQB2AA0118	MANUAL, OWNERS CT–32G22V
M010	TQB2AA0119	MANUAL, OWNERS (BI–LING) CT–32G22CV
M011	TQB2AA0145	MANUAL, OWNERS CT–32G12V
M012	TQB2AA0146	MANUAL, OWNERS (BI–LING) CT–32G12CV
M013	**TSX2AA0011**	**LINE CORD**
M014	TXFKU0797SER	ASSY, CABINET BACK 32" CT–32G22V CT–32G22CV
M015	TXFKU0497SER	ASSY, CABINET BACK 32" CT–32G12V CT–32G12CV
M016	TXFKY0997SER	ASSY. CABINET FRONT 32"
M017	EUR511000A	TRANSMITTER, REMOTE CONTROL CT–32G12V CT–32G12CV
M018	EUR511051A	TRANSMITTER, REMOTE CTRL CT–32G22V CT–32G22CV
M019	TXF3A01AFR	ASSY, DAG GND
M020	UR51EC843A	BATTERY COVER, REMOTE CT–32G22V CT–32G22CV
M021	UR51EC810A	BATTERY COVER, REMOTE CT–32G12V CT–32G12CV
M022	0FMK014ZZ	CONVERGENCE CORRECTOR STRIP
DEG	**0LK19050**	**COIL, DEGAUSSING 32"**
JK3031	TJB18619	AV TERMINAL (2AV VAO) CT–32G22V CT–32G22CV
JK3031A	TJB17662–1	TERMINAL, A/V CT–32G12V CT–32G12CV

DESCRIPTION OF ABBREVIATIONS GUIDE

RESISTOR			
TYPE		TOLERANCE	
C	Carbon	F	+/– 1%
F	Fuse	J	+/– 5%
M	Metal Oxide	K	+/– 10%
S	Solid	M	+/– 20%
W	Wire Wound	G	+/– 2%

RES, C 270–J–1/4

CAPACITOR			
TYPE		TOLERANCE	
C	Ceramic	C	+/– 0.25pF
E	Electrolytic	D	+/– 0.5pF
P	Polyester	F	+/– 1pF
S	Styrol	J	+/– 5%
T	Tantalum	K	+/– 10%
		L	+/– 15%
		M	+/– 20%
		P	+100% –0%
		Z	+80% –20%

CAP, P .068UF–K–50V

SERVICEMAN MODE (ELECTRONIC CONTROL)
SERVICE ADJUSTMENT VALUES

Model ______________________________ Ser# ______________ Date ______________

Note: Record the original settings PRIOR to modifying the registers.

Mode	Service Adjustment	Adjustment Range	Def Val.	Original Value	New Value
Sub Adjustments					
B0	Sub Color	0 ~ 63	33		
B1	Sub Tint	0 ~ 63	33		
B2	Sub Brightness	0 ~ 255	80		
B3	Sub Contrast	0 ~ 63	34		
B4	Killer/ABL/Gamma	0 ~ 7	5		
B5	Video Adjustment	0 ~ 15	8		
B6	Audio Adjustment	0 ~ 31	16		
B7	V–Size	0 ~ 63	20		
White Balance Adjustments					
C0	RED Cutoff	*	0 128		
C1	GRN Cutoff	0 ~ 255	64		
C2	BLU Cutoff	*	0 128		
C3	R Drive	0 ~ 127	64		
C4	Blue Drive	0 ~ 127	64		
C5	YNR Switch	0 ~ 1	0		
C6	AFT	*	0 120		
C7	RF AGC	0 ~ 127	64		
C8	YNR	0 ~ 7	0		
C9	Horizontal–Center	0 ~ 31	16		
Ca	Beam Limit	0 ~ 7	0		
Cb	Y Delay	0 ~ 2	2		

* Adjustment indicated in steps:
0 0 ~ 0 255
1 0 ~ 1 255

Mode	Service Adjustment	Adjustment Range	Def. Val.	Original Value	New Value
Options Adjustments					
S0	PIP Color	0 ~ 63	25		
S1	PIP Contrast	0 ~ 127	52		
S2	Up 1/9	0 ~ 255	26		
S3	Down 1/9	0 ~ 255	146		
S4	Left 1/9	0 ~ 255	9		
S5	Right 1/9	0 ~ 255	103		
S6	Up 1/16	0 ~ 255	27		
S7	Down 1/16	0 ~ 255	163		
S8	Left 1/16	0 ~ 255	9		
S9	Right 1/16	0 ~ 255	118		
Sa	Freerun	**	**		
Sb	Clock Adjustment	0 ~ 255	128		
Sc	Pip Tint	0 ~ 63	50		
Sd	Loudness Compensation	0 ~ 63	52		
MTS Adjustments					
M0	Input Level	0 ~ 63	31		
M1	Stereo PLLVCO	0 ~ 63	31		
M2	Filter	0 ~ 63	31		
M3	Low–level Separation	0 ~ 63	31		
M4	High–level Separation	0 ~ 63	31		

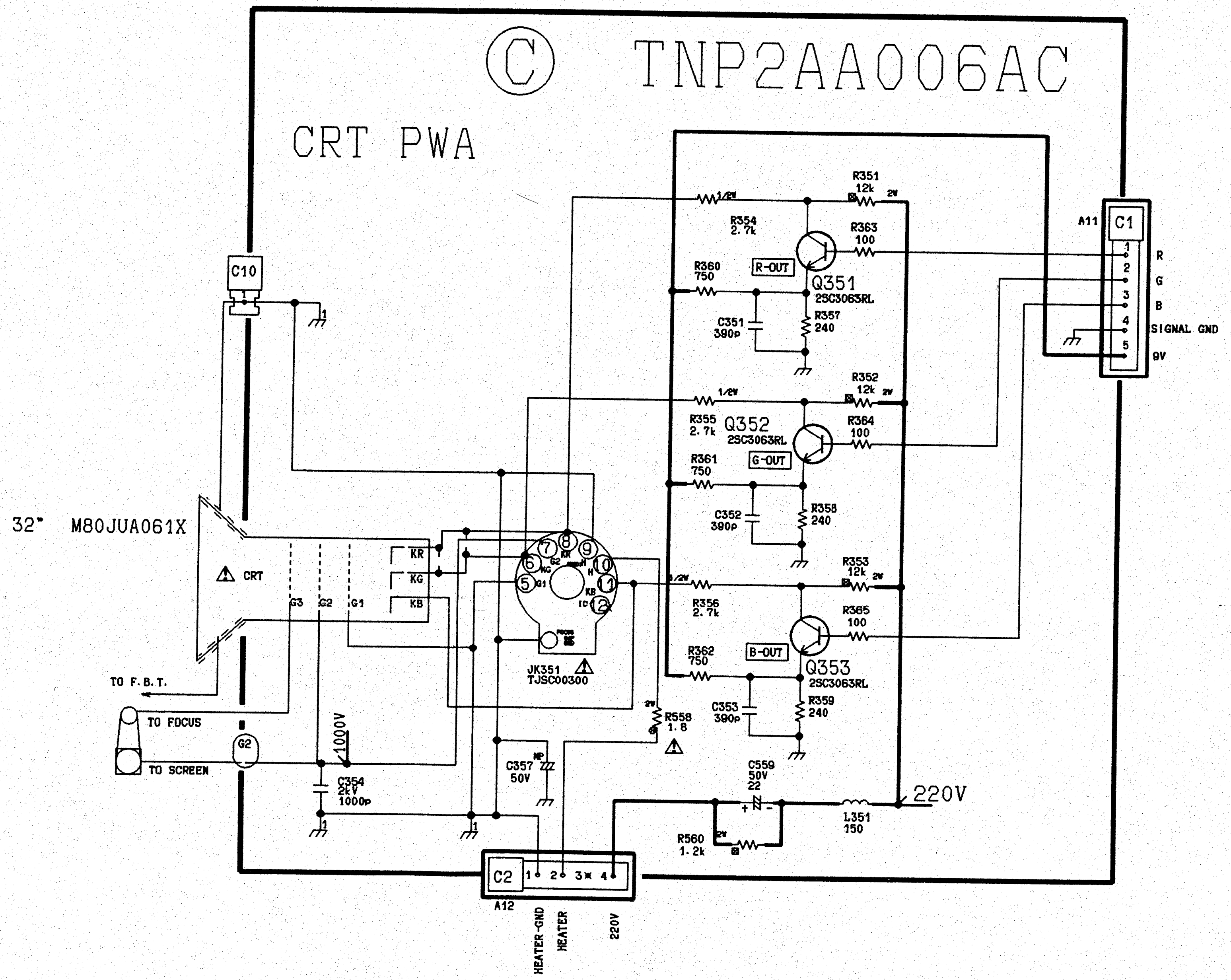
** Set Freerun on when this item is selected.

Printed in USA
97042500ME0509

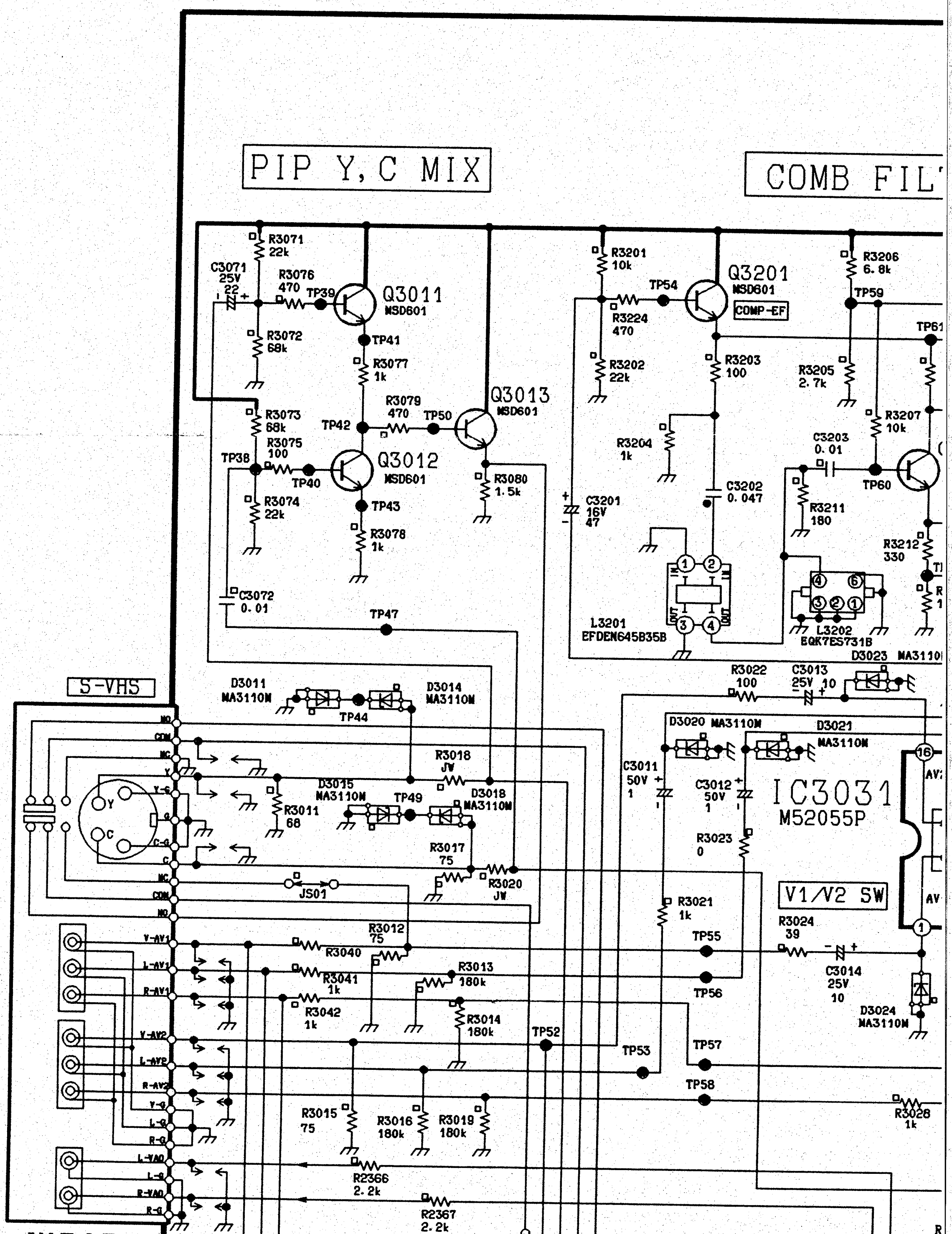
1

C-Board Schematic
CT-32G12V/UV/CV

2



Ⓒ TNP2AA006AC
CRT PWA
32" M80JUA061X
CRT
C10
C1
A11
R
G
B
SIGNAL GND
9V
R351 12k
R352 12k
R353 12k
R354 2.7k
R355 2.7k
R356 2.7k
R360 750
R361 750
R362 750
R363 100
R364 100
R365 100
R357 240
R358 240
R359 240
C351 390p
C352 390p
C353 390p
Q351 2SC3063RL
Q352 2SC3063RL
Q353 2SC3063RL
R-OUT
G-OUT
B-OUT
KR
KG
KB
G3
G2
G1
JK351 TJSC00300
R558 1.8
C357 50V
C354 2kV 1000p
1000V
C559 50V 22
L351 150
220V
R560 1.2k
C2
A12
HEATER-GND
HEATER
220V
TO F.B.T.
TO FOCUS
TO SCREEN
G2



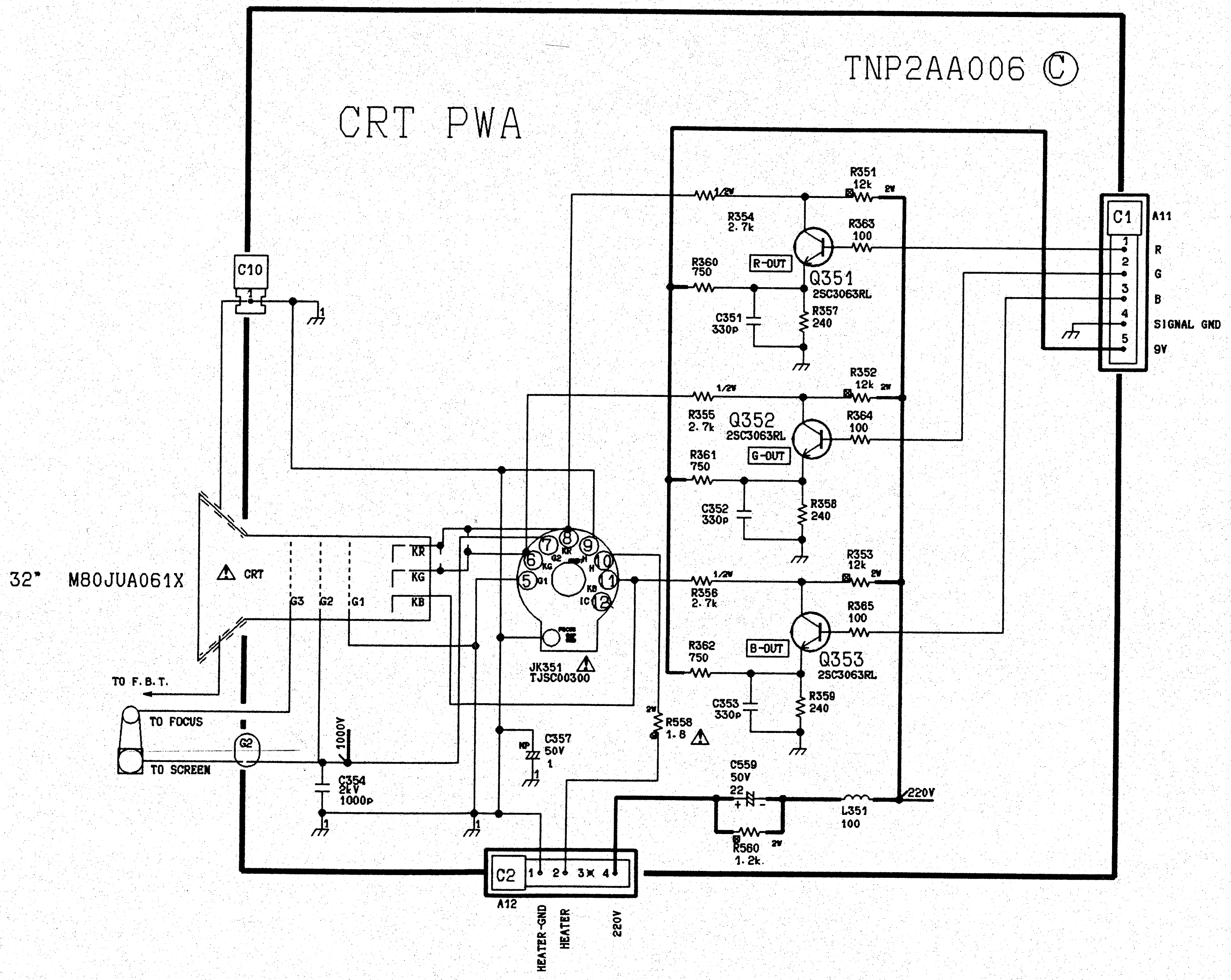
PIP Y,C MIX
COMB FIL
S-VHS
Q3011 MSD601
Q3012 MSD601
Q3013 MSD601
Q3201 MSD601
COMP-EF
R3071 22k
R3072 68k
R3073 68k
R3074 22k
R3075 100
R3076 470
R3077 1k
R3078 1k
R3079 470
R3080 1.5k
C3071 25V 22
C3072 0.01
R3201 10k
R3202 22k
R3203 100
R3204 1k
R3205 2.7k
R3206 6.8k
R3207 10k
R3211 180
R3212 330
R3224 470
C3201 16V 47
C3202 0.047
C3203 0.01
L3201 EFDEN645B35B
L3202 EQK7ES731B
TP38
TP39
TP40
TP41
TP42
TP43
TP44
TP47
TP49
TP50
TP52
TP53
TP54
TP55
TP56
TP57
TP58
TP59
TP60
D3011 MA3110M
D3014 MA3110M
D3015 MA3110M
D3018 MA3110M
D3020 MA3110M
D3021 MA3110M
D3023 MA3110
D3024 MA3110M
R3011 68
R3012 75
R3013 180k
R3014 180k
R3015 75
R3016 180k
R3017 75
R3018 JW
R3019 180k
R3020 JW
R3021 1k
R3022 100
R3023 0
R3024 39
R3028 1k
R3040
R3041 1k
R3042 1k
R2366 2.2k
R2367 2.2k
C3011 50V 1
C3012 50V 1
C3013 25V 10
C3014 25V 10
JS01
IC3031 M52055P
V1/V2 SW
Y
C
Y-AV1
L-AV1
R-AV1
Y-AV2
L-AV2
R-AV2

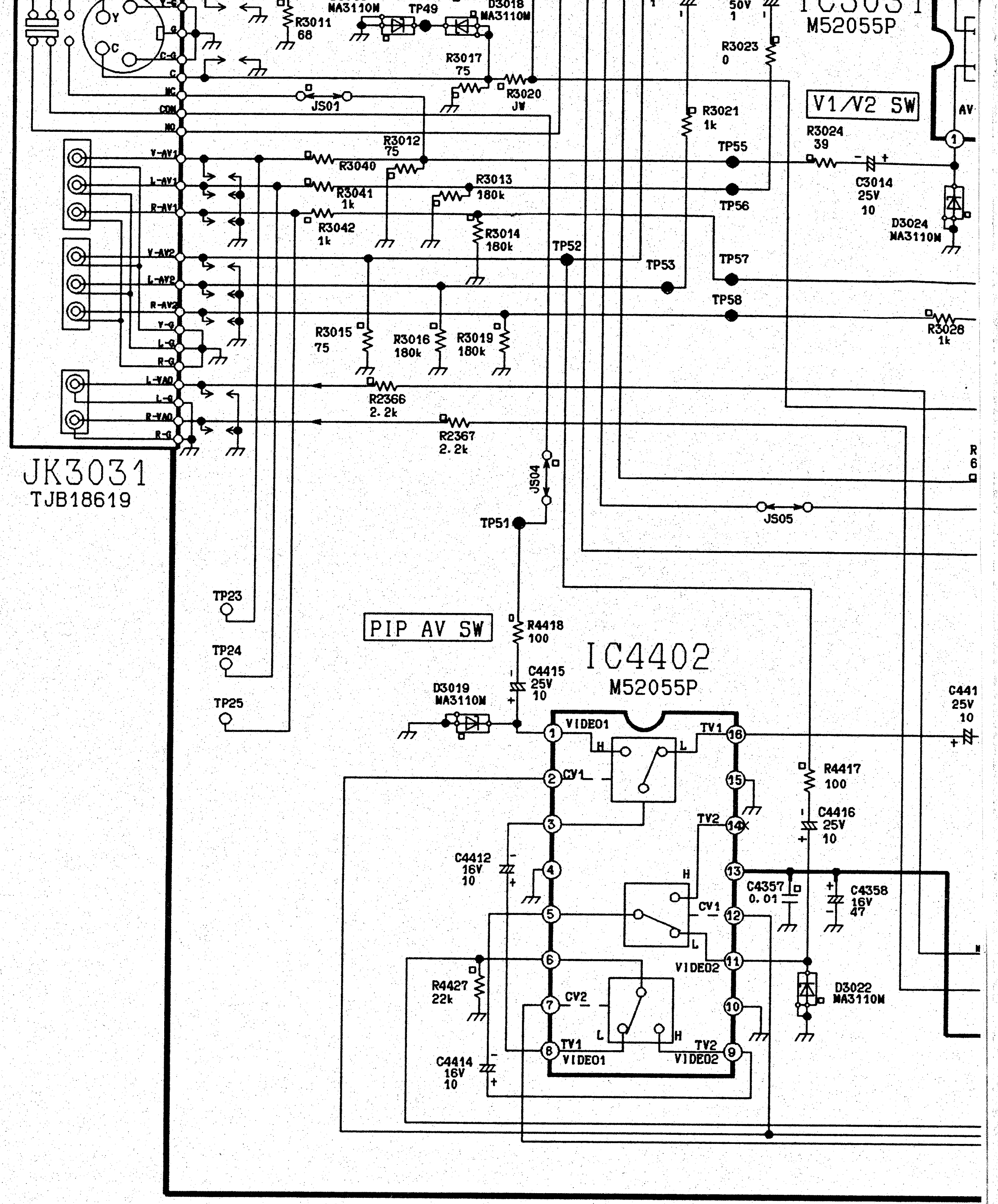
3

C-Board Schematic

MTC9704699C1

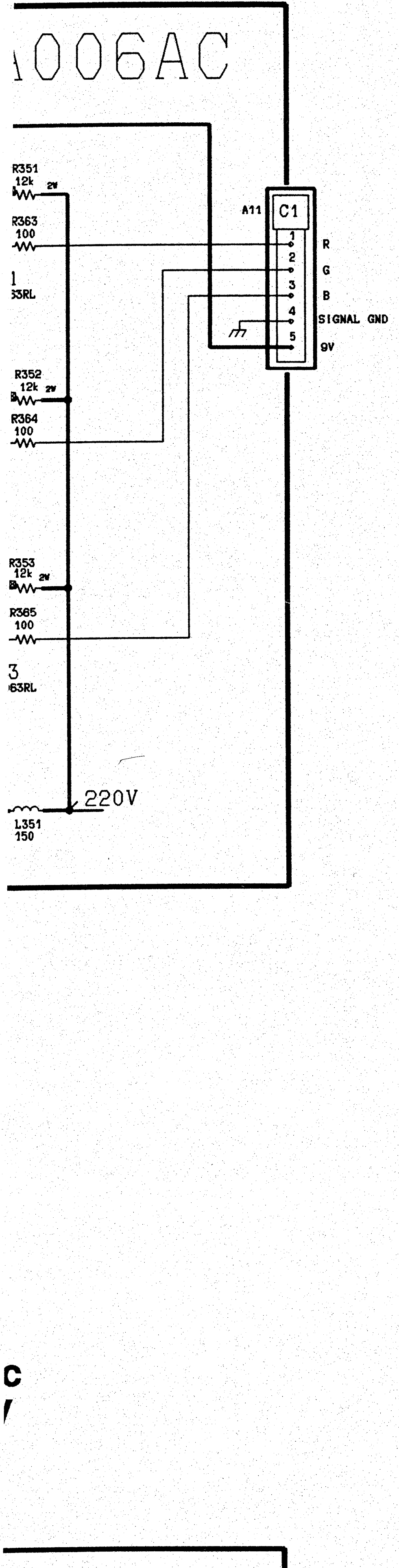
C-Board Schematic
CT-32G22V/UV/CV


TNP2AA006 Ⓒ
CRT PWA
C10
C1
A11
R
G
B
SIGNAL GND
9V
R351 12k 2W
R354 2.7k
R363 100
R360 750
R-OUT
Q351 2SC3063RL
C351 330p
R357 240
R352 12k 2W
R355 2.7k
Q352 2SC3063RL
R364 100
R361 750
G-OUT
C352 330p
R358 240
R353 12k 2W
R356 2.7k
R365 100
R362 750
B-OUT
Q353 2SC3063RL
C353 330p
R359 240
32" M80JUA061X
CRT
KR
KG
KB
G3
G2
G1
JK351 TJSC00300
TO F.B.T.
TO FOCUS
TO SCREEN
1000V
C354 2kV 1000p
C357 50V 1
R558 1.8
C559 50V 22
R560 1.2k
L351 100
220V
C2
A12
HEATER-GND
HEATER
220V

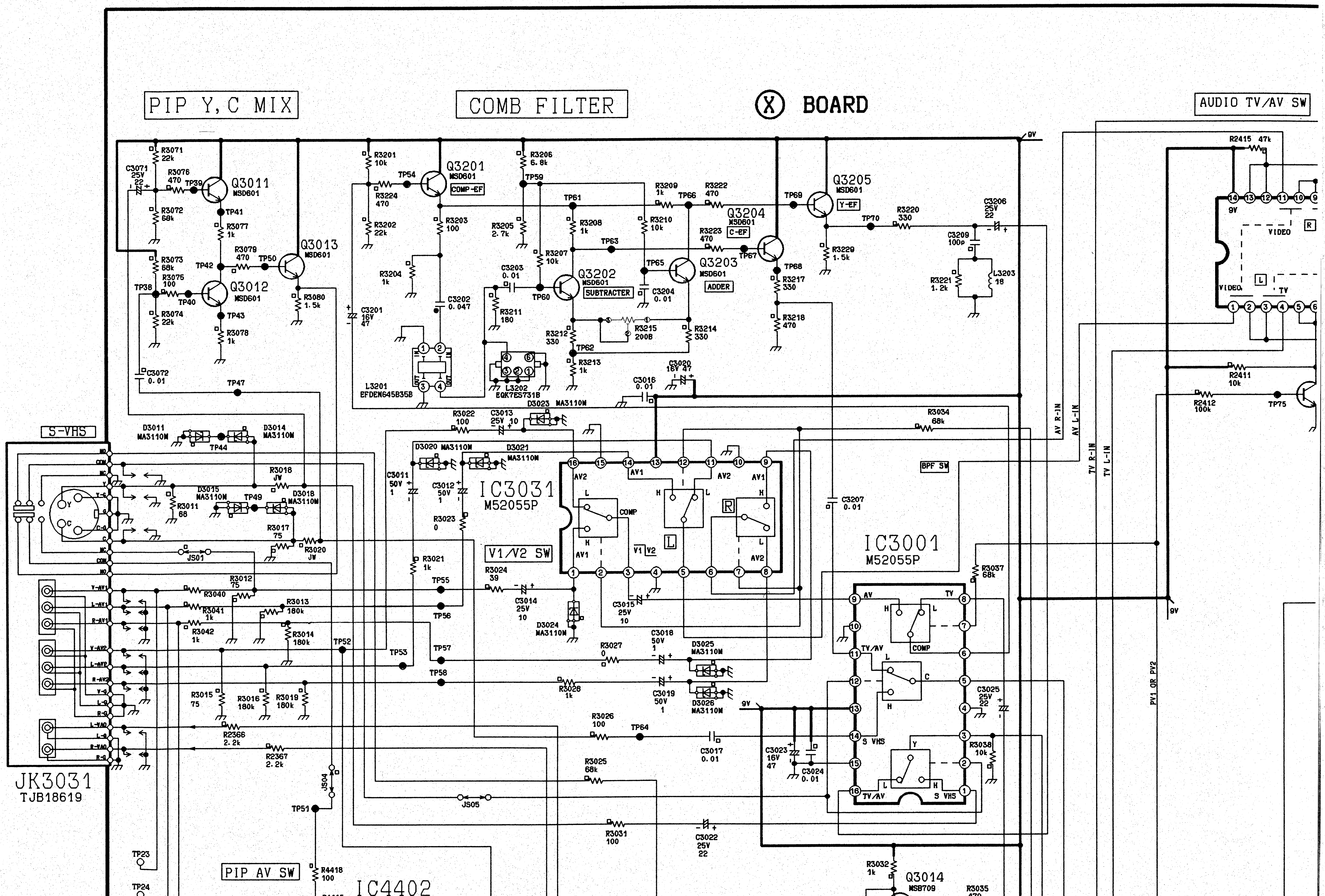

MA3110M
TP49
D3018 MA3110M
R3011 68
R3017 75
R3020 JW
JS01
R3023 0
M52055P
V1/V2 SW
R3021 1k
TP55
R3024 39
C3014 25V 10
D3024 MA3110M
R3012 75
R3040
R3013 180k
R3041 1k
R3042 1k
R3014 180k
TP52
TP53
TP56
TP57
TP58
R3028 1k
R3015 75
R3016 180k
R3019 180k
R2366 2.2k
R2367 2.2k
JK3031 TJB18619
JS04
JS05
TP51
TP23
TP24
TP25
PIP AV SW
R4418 100
C4415 25V 10
IC4402 M52055P
D3019 MA3110M
VIDEO1
TV1
CV1
TV2
R4417 100
C4416 25V 10
C4412 16V 10
C4357 0.01
C4358 16V 47
VIDEO2
R4427 22k
D3022 MA3110M
CV2
C4414 16V 10
C441 25V 10

IMPORTANT SAFETY
THIS SCHEMATIC DIAGRAM INCORP
FEATURES THAT ARE IMPORTANT FOR
X-RADIATION, FIRE AND ELECTRICAL
WHEN SERVICING IT IS ESSENT
MANUFACTURERS SPECIFIED PARTS E
CRITICAL COMPONENTS DESIGNATED
SCHEMATIC.

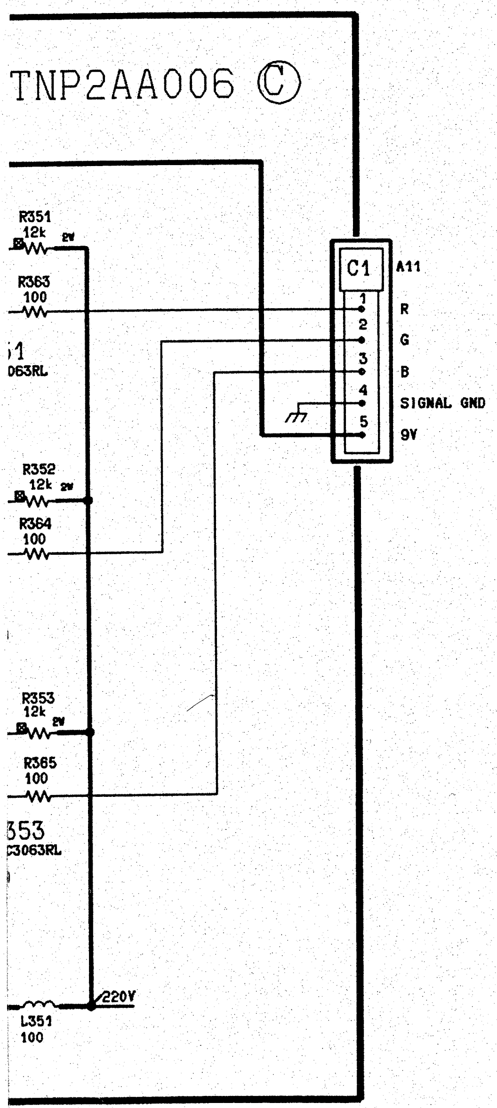
X–Board Schematic
CT–32G22V/UV/CV

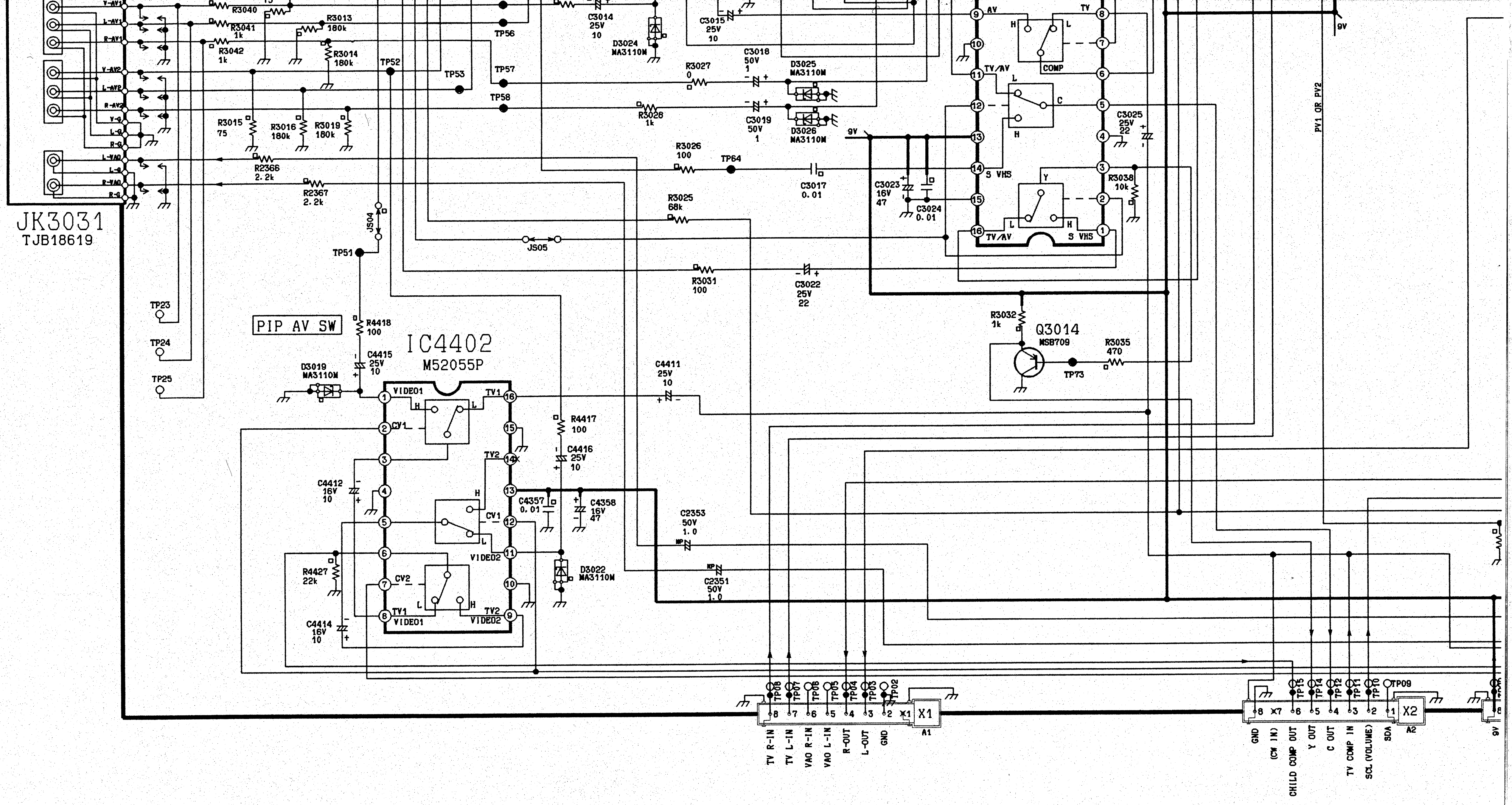


A006AC
R351 12k
R363 100
R352 12k
R364 100
R353 12k
R365 100
A11
C1
R
G
B
SIGNAL GND
9V
220V
L351 150



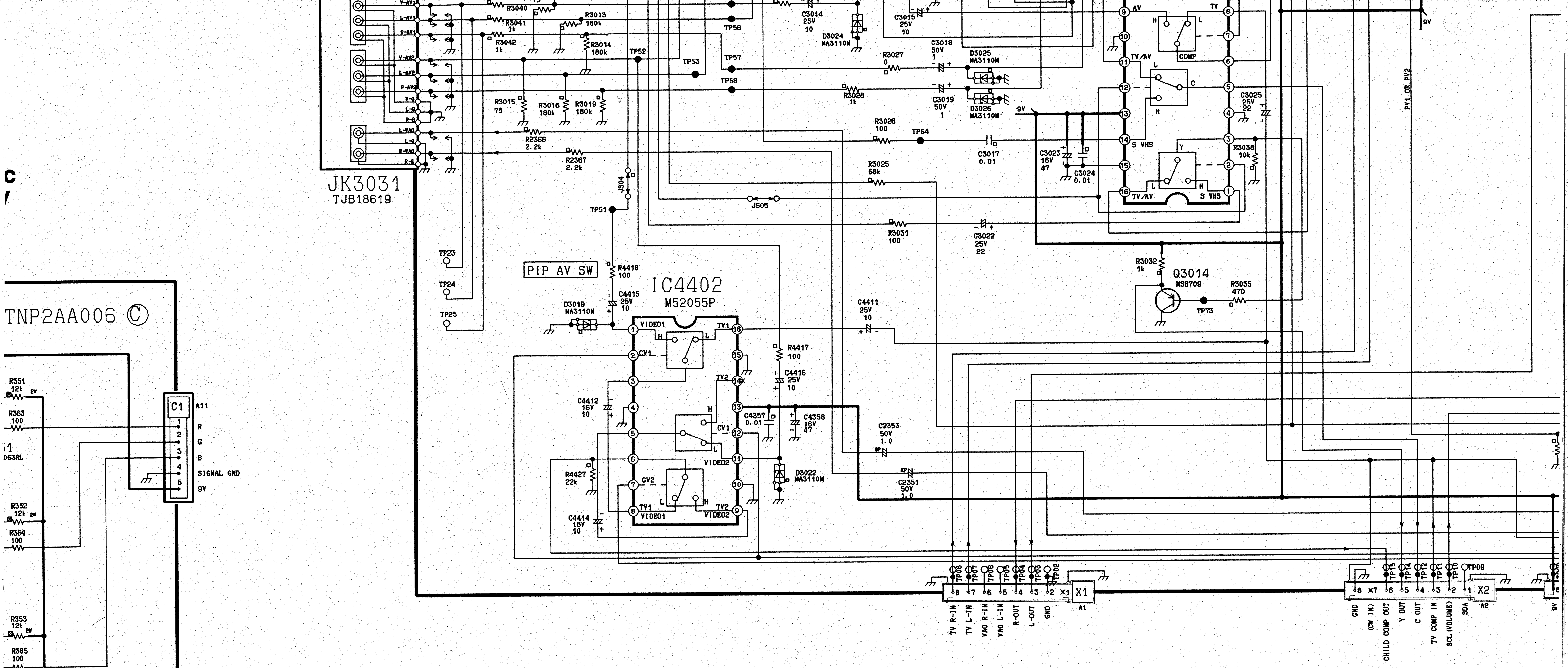
PIP Y,C MIX
COMB FILTER
Ⓧ BOARD
AUDIO TV/AV SW
Q3011 MSD601
Q3012 MSD601
Q3013 MSD601
Q3201 MSD601
COMP-EF
Q3202 MSD601
SUBTRACTER
Q3203 MSD601
ADDER
Q3204 MSD601
C-EF
Q3205 MSD601
Y-EF
L3201 EFDEN645B35B
L3202 EQK7E5731B
S-VHS
JK3031
TJB18619
IC3031
M52055P
V1/V2 SW
IC3001
M52055P
BPF SW
PIP AV SW
IC4402
Q3014 MSB709
AV R-IN
AV L-IN
TV R-IN
TV L-IN
PV1 OR PV2
VIDEO
TV
D3011 MA3110M
D3014 MA3110M
D3015 MA3110M
D3018 MA3110M
D3020 MA3110M
D3021 MA3110M
D3023 MA3110M
D3024 MA3110M
D3025 MA3110M
D3026 MA3110M
JS01
JS04
JS05
9V


TNP2AA006 Ⓒ
R351 12k
R363 100
R352 12k
R364 100
R353 12k
R365 100
L351 100
220V
C1
A11
R
G
B
SIGNAL GND
9V
1
2
3
4
5
063RL
353
C3063RL


JK3031
TJB18619
V-AV1
L-AV1
R-AV1
V-AV2
L-AV2
R-AV2
V-9
L-9
R-9
L-VAO
L-9
R-VAO
R-9
R3040
R3041 1k
R3042 1k
R3013 180k
R3014 180k
R3015 75
R3016 180k
R3019 180k
R2366 2.2k
R2367 2.2k
TP52
TP53
TP56
TP57
TP58
TP51
TP23
TP24
TP25
JS04
JS05
C3014 25V 10
D3024 MA3110M
C3015 25V 10
C3018 50V 1
R3027 0
D3025 MA3110M
R3028 1k
C3019 50V 1
D3026 MA3110M
R3026 100
TP64
C3017 0.01
R3025 68k
R3031 100
C3022 25V 22
9V
C3023 16V 47
C3024 0.01
C3025 25V 22
R3038 10k
AV
TV
TV/AV
COMP
S VHS
R3032 1k
Q3014 MSB709
R3035 470
TP73
PV1 OR PV2
PIP AV SW
R4418 100
C4415 25V 10
D3019 MA3110M
IC4402
M52055P
VIDEO1
TV1
CV1
TV2
CV2
VIDEO2
C4412 16V 10
R4427 22k
C4414 16V 10
C4411 25V 10
R4417 100
C4416 25V 10
C4357 0.01
C4358 16V 47
D3022 MA3110M
C2353 50V 1.0
C2351 50V 1.0
TP08
TP07
TP06
TP05
TP04
TP03
TP02
X1
A1
TV R-IN
TV L-IN
VAO R-IN
VAO L-IN
R-OUT
L-OUT
GND
TP15
TP14
TP13
TP12
TP11
TP10
TP09
X2
A2
GND
(CW IN)
CHILD COMP OUT
Y OUT
C OUT
TV COMP IN
SCL (VOLUME)
SDA
9V

IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A ⚠ IN THE SCHEMATIC.


JK3031
TJB18619
Y-AV1
L-AV1
R-AV1
Y-AV2
L-AV2
R-AV2
Y-Q
L-Q
R-Q
L-VAO
L-Q
R-VAO
R-Q
R3040
R3041
1k
R3042
1k
R3013
180k
R3014
180k
R3015
75
R3016
180k
R3019
180k
R2366
2.2k
R2367
2.2k
TP52
TP53
TP56
TP57
TP58
TP51
TP23
TP24
TP25
TP64
TP73
JS04
JS05
C3014
25V
10
D3024
MA3110M
C3015
25V
10
R3027
0
C3018
50V
1
D3025
MA3110M
R3028
1k
C3019
50V
1
D3026
MA3110M
R3026
100
C3017
0.01
R3025
68k
R3031
100
C3022
25V
22
9V
C3023
16V
47
C3024
0.01
C3025
25V
22
R3038
10k
AV
TV
H
L
COMP
TV/AV
C
S VHS
Y
TV/AV
S VHS
R3032
1k
Q3014
MSB709
R3035
470
PV1 OR PV2
PIP AV SW
R4418
100
C4415
25V
10
IC4402
M52055P
D3019
MA3110M
VIDEO1
TV1
CV1
TV2
CV1
VIDEO2
CV2
TV1
VIDEO1
TV2
VIDEO2
C4412
16V
10
R4427
22k
C4414
16V
10
C4411
25V
10
R4417
100
C4416
25V
10
C4357
0.01
C4358
16V
47
D3022
MA3110M
C2353
50V
1.0
NP
C2351
50V
1.0
NP
TP08
TP07
TP06
TP05
TP04
TP03
TP02
X1
A1
TV R-IN
TV L-IN
VAO R-IN
VAO L-IN
R-OUT
L-OUT
GND
TP15
TP14
TP12
TP11
TP10
TP09
X7
X2
A2
GND
(CW IN)
CHILD COMP OUT
Y OUT
C OUT
TV COMP IN
SCL (VOLUME)
SDA
9V
TNP2AA006 Ⓒ
C1
A11
R
G
B
SIGNAL GND
9V
R351
12k
9V
R363
100
063RL
R352
12k
9V
R364
100
R353
12k
9V
R365
100
353
C3063RL
220V
L351
100

IMPORTANT SAFETY NOTICE

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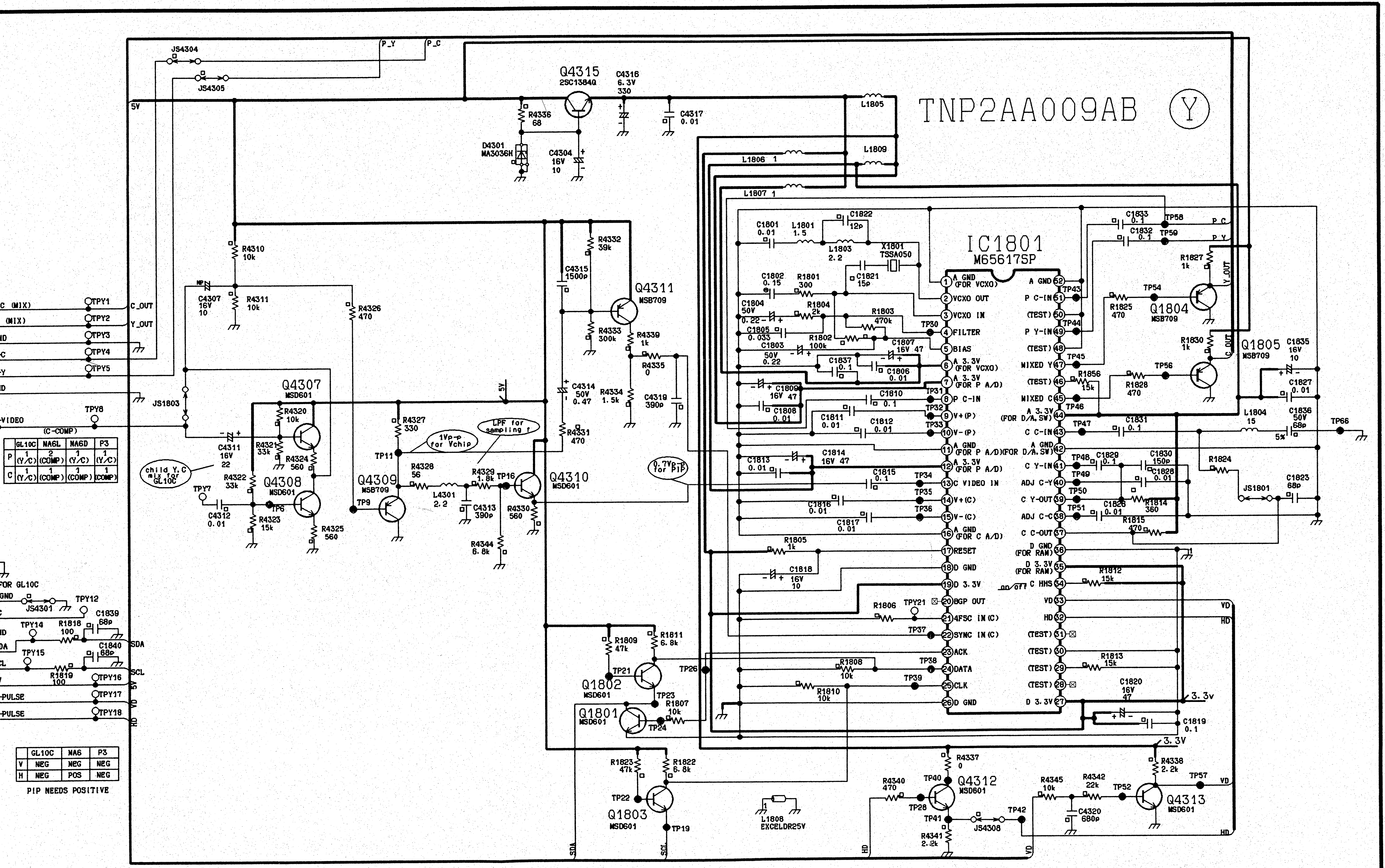
Y-Board Schematic
CT-32G22V/UV/CV


TNP2AA009AB
Y
IC1801
M65617SP
Q4315
2SC1384Q
Q4311
MSB709
Q4307
MSD601
Q4308
MSD601
Q4309
MSB709
Q4310
MSD601
Q1804
MSB709
Q1805
MSB709
Q1802
MSD601
Q1801
MSD601
Q1803
MSD601
Q4312
MSD601
Q4313
MSD601
D4301
MA3036H
X1801
TSSA050
L1805
L1806
L1807
L1809
L1801
L1803
L1804
L1808
EXCELDR25V
L4301
JS4304
JS4305
JS1803
JS4301
JS1801
JS4308
5V
3.3V
P_Y
P_C
C_OUT
Y_OUT
TPY1
TPY2
TPY3
TPY4
TPY5
TPY8
TPY12
TPY14
TPY15
TPY16
TPY17
TPY18
TPY21
1Vp-p for Vchip
LPF for sampling f
0.7Vp-p for PIP
child Y.C mix for GL10C
1 GND (FOR VCXO)
2 VCXO OUT
3 VCXO IN
4 FILTER
5 BIAS
6 A 3.3V (FOR VCXO)
7 A 3.3V (FOR P A/D)
8 P C-IN
9 V+(P)
10 V-(P)
11 A GND (FOR P A/D)
12 A 3.3V (FOR P A/D)
13 C VIDEO IN
14 V+(C)
15 V-(C)
16 A GND (FOR C A/D)
17 RESET
18 D GND
19 D 3.3V
20 BGP OUT
21 4FSC IN(C)
22 SYNC IN(C)
23 ACK
24 DATA
25 CLK
26 D GND
52 A GND
51 P C-IN
50 (TEST)
49 P Y-IN
48 (TEST)
47 MIXED Y
46 (TEST)
45 MIXED C
44 A 3.3V (FOR D/A, SW)
43 C C-IN
42 A GND (FOR D/A, SW)
41 C Y-IN
40 ADJ C-Y
39 C Y-OUT
38 ADJ C-C
37 C C-OUT
36 D GND (FOR RAM)
35 D 3.3V (FOR RAM)
34 C HHS
33 VD
32 HD
31 (TEST)
30 (TEST)
29 (TEST)
28 (TEST)
27 D 3.3V
SDA
SCL
VD
HD
C (MIX)
(MIX)
-VIDEO
(C-COMP)
FOR GL10C
-PULSE
-PULSE
PIP NEEDS POSITIVE

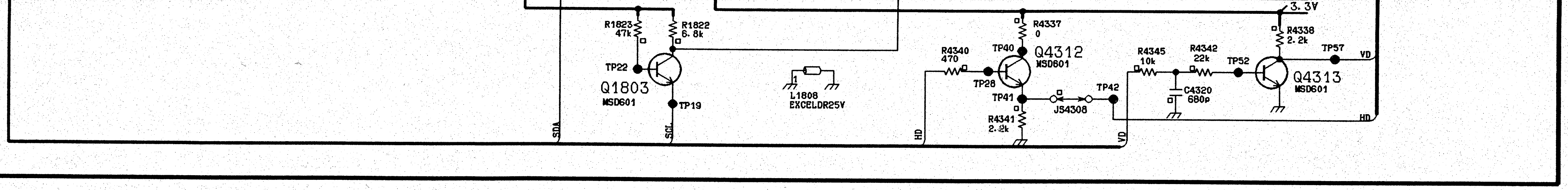
	GL10C	NAGL	NAGD	P3
P	1 (Y/C)	2 (COMP)	1 (Y/C)	1 (Y/C)
C	1 (Y/C)	1 (COMP)	1 (COMP)	1 (COMP)

	GL10C	NAG	P3
V	NEG	NEG	NEG
H	NEG	POS	NEG

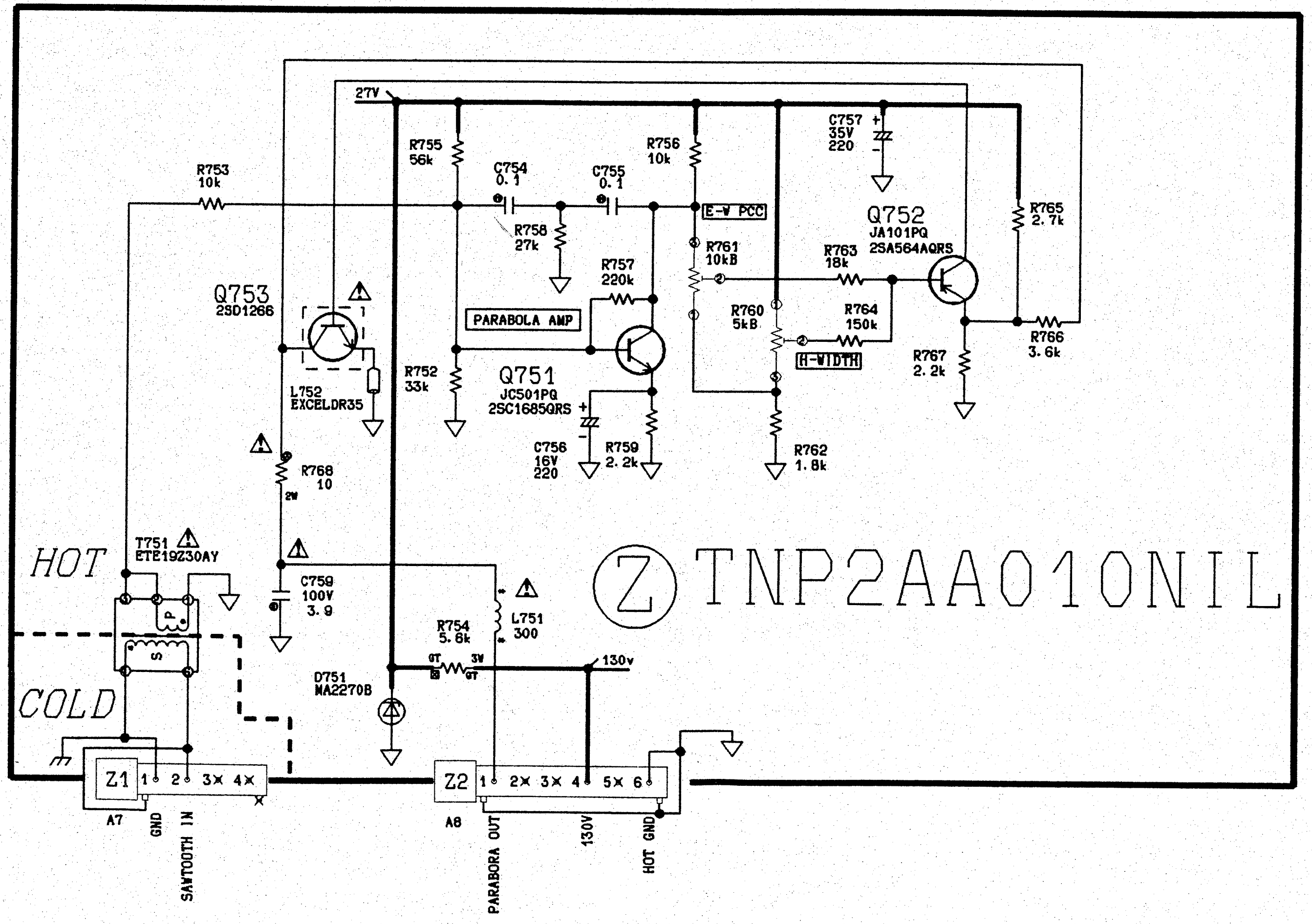
PIP NEEDS POSITIVE

	GL10C	NA6	P3
V	NEG	NEG	NEG
H	NEG	POS	NEG

PIP NEEDS POSITIVE


3.3V
R1823 47k
R1822 6.8k
TP22
Q1803
MSD601
TP19
L1808
EXCELDR25V
R4337 0
R4340 470
TP40
Q4312
MSD601
TP28
TP41
R4341 2.2k
J54308
TP42
R4345 10k
R4342 22k
TP52
C4320 680p
Q4313
MSD601
R4338 2.2k
TP57
VD
HD
SDA
SCL
HD
VD

Z–Board Schematic
(All Models)


27V
R755 56k
C754 0.1
C755 0.1
R756 10k
C757 35V 220
R753 10k
R758 27k
E-W PCC
Q752
JA101PQ
2SA564AQRS
R765 2.7k
R761 10kB
R763 18k
Q753
2SD1266
R757 220k
PARABOLA AMP
R760 5kB
R764 150k
R766 3.6k
R752 33k
Q751
JC501PQ
2SC1685QRS
H-WIDTH
R767 2.2k
L752
EXCELDR35
C756 16V 220
R759 2.2k
R762 1.8k
R768 10
HOT
T751
ETE19Z30AY
C759 100V 3.9
R754 5.6k
L751 300
Z TNP2AA010NIL
130V
COLD
D751
MA2270B
Z1
A7
GND
SAWTOOTH IN
Z2
A8
PARABORA OUT
130V
HOT GND

IMPORTANT SAFETY NOTICE

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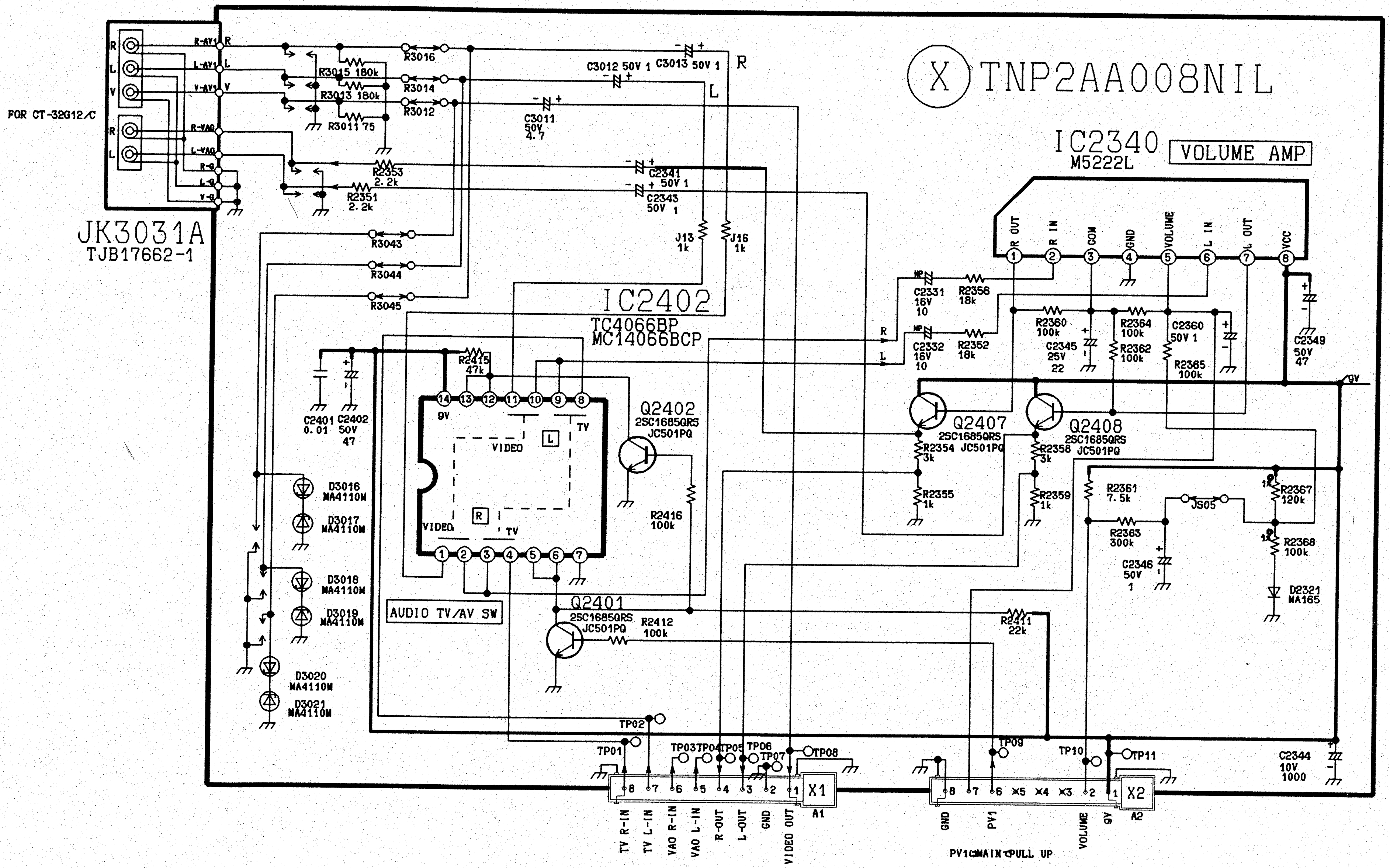
Board Index

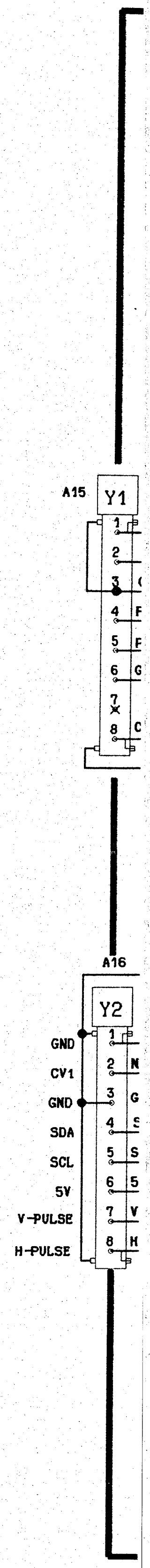
“A”–Board – Main Chassis
“C”–Board – CRT Board
“X”–Board – Input/Output Jacks, A/V Switch
“Y”–Board – PIP Processing (CT–32G22V/UV/CV only)
“Z”–Board – Pin Cushion Board

X–Board Schematic
CT–32G12V/UV/CV

1


X TNP2AA008NIL
FOR CT-32G12/C
R
L
V
R
L
R-AV1 R
L-AV1 L
V-AV1 V
R-VAO
L-VAO
R-G
L-G
V-G
JK3031A
TJB17662-1
R3016
R3015 180k
R3014
R3013 180k
R3012
R3011 75
C3012 50V 1
C3013 50V 1
R
L
C3011 50V 4.7
R2353 2.2k
R2351 2.2k
C2341 50V 1
C2343 50V 1
J13 1k
J16 1k
R3043
R3044
R3045
IC2402
TC4066BP
MC14066BCP
R2415 47k
C2401 0.01
C2402 50V 47
9V
VIDEO
L
TV
R
VIDEO
TV
Q2402
2SC1685QRS
JC501PQ
R2416 100k
AUDIO TV/AV SW
Q2401
2SC1685QRS
JC501PQ
R2412 100k
D3016 MA4110M
D3017 MA4110M
D3018 MA4110M
D3019 MA4110M
D3020 MA4110M
D3021 MA4110M
IC2340
M5222L
VOLUME AMP
R OUT
R IN
COM
GND
VOLUME
L IN
L OUT
VCC
C2331 16V 10
R2356 18k
C2332 16V 10
R2352 18k
R
L
R2360 100k
C2345 25V 22
R2364 100k
R2362 100k
C2360 50V 1
R2365 100k
C2349 50V 47
9V
Q2407
2SC1685QRS
JC501PQ
R2354 3k
R2355 1k
Q2408
2SC1685QRS
JC501PQ
R2358 3k
R2359 1k
R2361 7.5k
R2363 300k
C2346 50V 1
JS05
R2367 120k
R2368 100k
D2321 MA165
R2411 22k
TP01
TP02
TP03
TP04
TP05
TP06
TP07
TP08
TP09
TP10
TP11
C2344 10V 1000
8 7 6 5 4 3 2 1
X1
A1
TV R-IN
TV L-IN
VAO R-IN
VAO L-IN
R-OUT
L-OUT
GND
VIDEO OUT
8 7 6 ×5 ×4 ×3 2 1
X2
A2
GND
PV1
VOLUME
9V
PV1⊂MAIN⊂PULL UP

2


A15
Y1
A16
Y2
GND
CV1
GND
SDA
SCL
5V
V-PULSE
H-PULSE

3

Note: Stereo Models

The Functions listed below are activated by a DC voltage change to DAC Inputs(Pin 5 and 6) of MPU IC001. Press and hold a function button on the Receiver to measure voltages.

FUNCTION	PIN 5	PIN 6
POWER	0V~0.443V	N/A
VOL ◀	0.797V~1.07V	N/A
VOL ▶	1.424V~1.696V	N/A
CH ▼	2.05V~2.323V	N/A
CH ▲	2.677V~2.95V	N/A
TV/VIDEO	3.304V~3.576V	N/A
ACTION	N/A	0V~0.443V
SHUT DOWN	N/A	3.930V~5.000V

The AUDIO MODES being broadcast are displayed on screen in red by the voltage change to DAC input (Pin 11) of MPU IC001.

AUDIO MODE BROADCAST	PIN 11 MN1873265T7G
MONO	4.0V~5.0V
SAP	2.2V~3.8V
STEREO	0.9V~1.9V
STEREO & SAP	0V~0.6V

Tuner Voltage Chart

Enable, Data, and Clock have no DC readings. They are digital signals from the MPU.

NOTE: Voltage at the 30V test pin varies with channel selection. Refer to chart for sample tuning voltages of TV/CATV(CABLE) channels as shown.

Voltage Reading Are Nominal And May Vary ± 15%

- VHF -	
Ch. 02	4.0V
Ch. 06	8.2V
Ch. 07	7.0V
Ch. 13	9.3V

- UHF -	
Ch. 14	7.7V
Ch. 69	24V

- CABLE -					
1st Band		2nd Band		3rd Band	
Ch. 1	6.7V	Ch. 16	4.5V	Ch. 47	3.7V
Ch. 15	24.7V	Ch. 46	2.70V	Ch. 94	14.9V
Ch. 95	9.8V			Ch. 100	15.1V
Ch. 99	17.5V			Ch. 125	24.0V

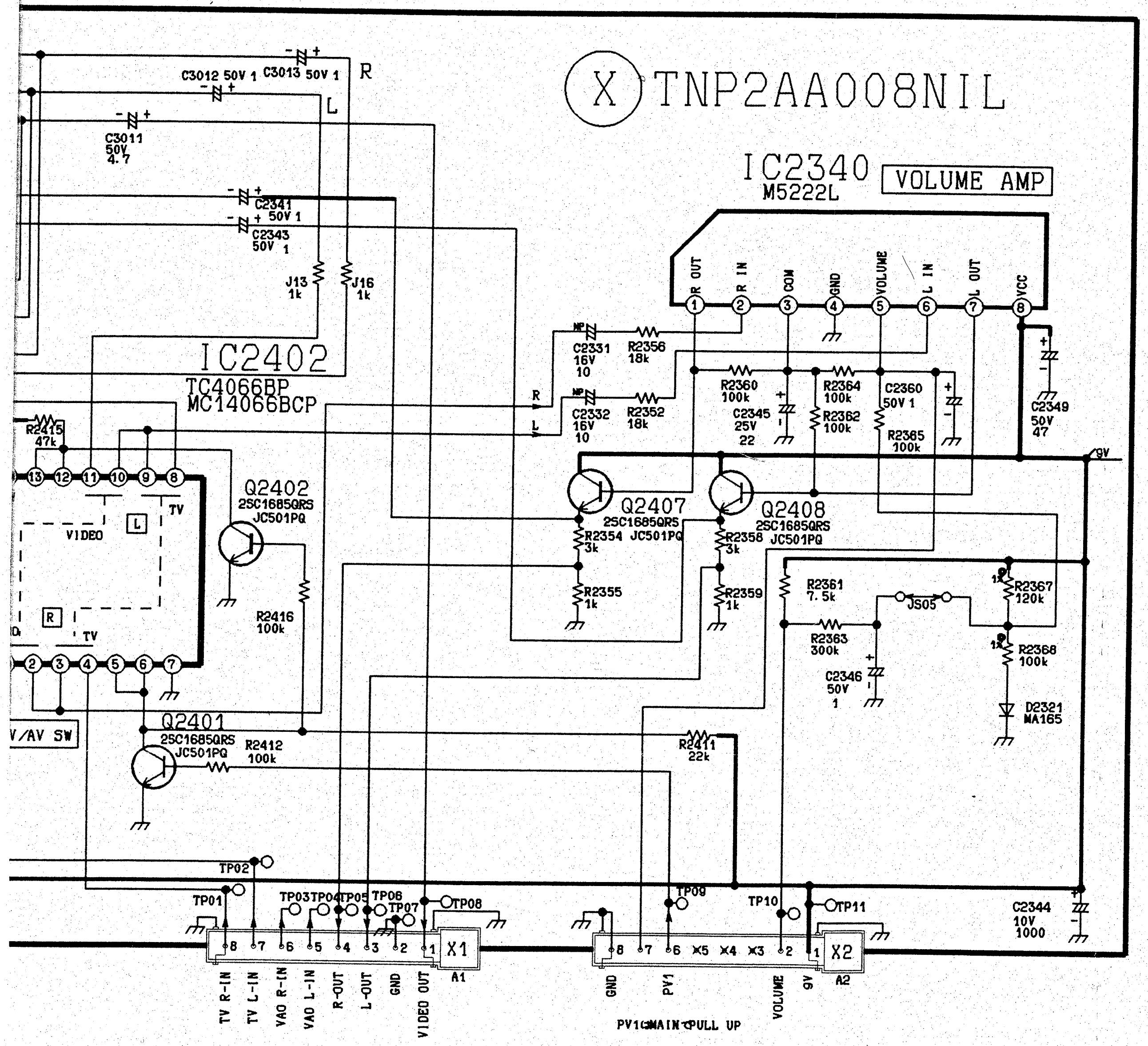
MICROPROCESSOR PROGRAMMING FOR BAND TUNING/SWITCHING

54MHz ◄──► 130MHz ◄──► 360MHz ◄──► 806MHz

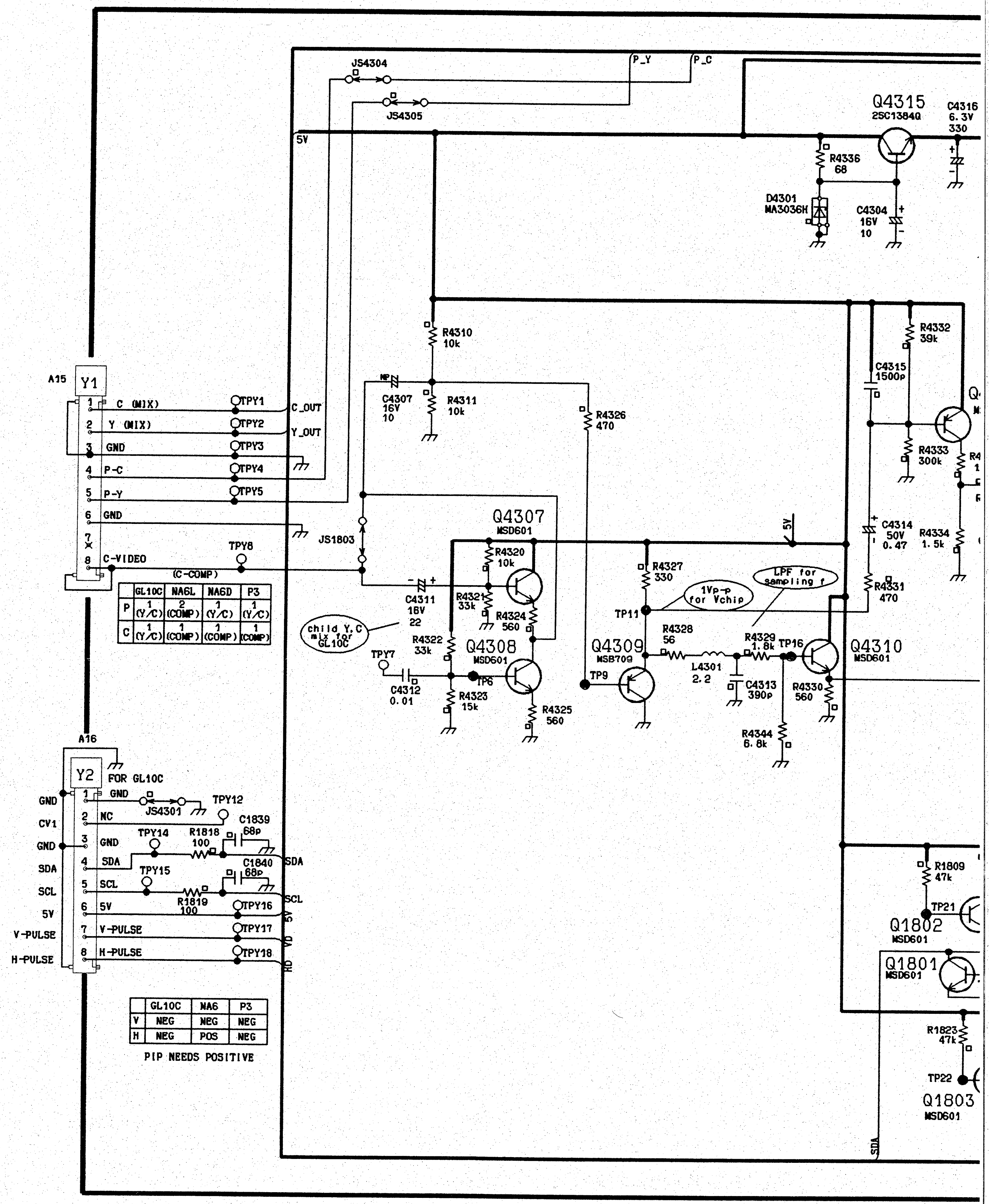
	FIRST TUNING BAND	SECOND TUNING BAND	THIRD TUNING BAND
VHF	02~06	07~13	
UHF			14~69
CABLE	01~06,14,15, 95~99	07~13, 16~46	47~94, 100~125

NOTE: CABLE channel numbers as recommended by the joint EIA/NCTA Engineering Committee and published as EIA INTERIM STANDARD NO. 6 – CABLE TELEVISION CHANNEL IDENTIFICATION PLAN – MAY 1983.

X–Board Schematic
CT–32G12V/UV/CV


X TNP2AA008NIL
IC2340 M5222L VOLUME AMP
R OUT
R IN
COM
GND
VOLUME
L IN
L OUT
VCC
IC2402 TC4066BP MC14066BCP
Q2402 2SC1685QRS JC501PQ
Q2407 2SC1685QRS JC501PQ
Q2408 2SC1685QRS JC501PQ
Q2401 2SC1685QRS JC501PQ
C3012 50V 1
C3013 50V 1
C3011 50V 4.7
C2341 50V 1
C2343 50V 1
J13 1k
J16 1k
C2331 16V 10
R2356 18k
C2332 16V 10
R2352 18k
R2360 100k
C2345 25V 22
R2364 100k
R2362 100k
C2360 50V 1
R2365 100k
C2349 50V 47
R2354 3k
R2355 1k
R2358 3k
R2359 1k
R2361 7.5k
R2363 300k
C2346 50V 1
JS05
R2367 120k
R2368 100k
D2321 MA165
R2415 47k
R2416 100k
R2412 100k
R2411 22k
C2344 10V 1000
VIDEO
TV
V/AV SW
9V
TP01
TP02
TP03
TP04
TP05
TP06
TP07
TP08
TP09
TP10
TP11
X1
A1
X2
A2
TV R-IN
TV L-IN
VAO R-IN
VAO L-IN
R-OUT
L-OUT
GND
VIDEO OUT
GND
PV1
VOLUME
9V
PV1≑MAIN PULL UP

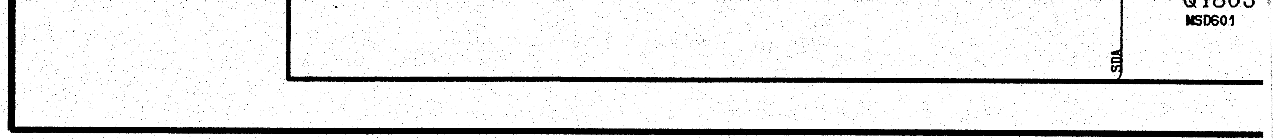
Y–Bo
CT–3


JS4304
JS4305
P_Y
P_C
5V
Q4315 2SC1384Q
C4316 6.3V 330
R4336 68
D4301 MA3036H
C4304 16V 10
R4310 10k
R4332 39k
C4315 1500p
C4307 16V 10
R4311 10k
R4326 470
R4333 300k
C4314 50V 0.47
R4334 1.5k
A15
Y1
C (MIX)
Y (MIX)
GND
P-C
P-Y
GND
C-VIDEO
(C-COMP)
TPY1
TPY2
TPY3
TPY4
TPY5
TPY8
C_OUT
Y_OUT
JS1803
Q4307 MSD601
R4320 10k
R4321 33k
R4324 560
C4311 16V 22
child Y,C mix for GL10C
R4327 330
1Vp-p for Vchip
LPF for sampling f
R4331 470
TP11
R4322 33k
Q4308 MSD601
TP6
TPY7
C4312 0.01
R4323 15k
R4325 560
Q4309 MSB709
TP9
R4328 56
L4301 2.2
R4329 1.8k
C4313 390p
TP16
Q4310 MSD601
R4330 560
R4344 6.8k
A16
Y2
FOR GL10C
GND
NC
GND
SDA
SCL
5V
V-PULSE
H-PULSE
CV1
JS4301
TPY12
C1839 68p
TPY14
R1818 100
C1840 68p
TPY15
R1819 100
TPY16
TPY17
TPY18
SDA
SCL
5V
VD
HD
R1809 47k
TP21
Q1802 MSD601
Q1801 MSD601
R1823 47k
TP22
Q1803 MSD601
SDA

	GL10C	NA6L	NA6D	P3
P	1 (Y/C)	2 (COMP)	1 (Y/C)	1 (Y/C)
C	1 (Y/C)	1 (COMP)	1 (COMP)	1 (COMP)

	GL10C	NA6	P3
V	NEG	NEG	NEG
H	NEG	POS	NEG

PIP NEEDS POSITIVE



vated by a DC voltage change to DAC
Press and hold a function button on the

	PIN 6
	N/A
7V	N/A
96V	N/A
3V	N/A
5V	N/A
76V	N/A
	0V~0.443V
	3.930V~5.000V

st are displayed on screen in red by
n 11) of MPU IC001.

PIN 11
IN1873265T7G
.0V~5.0V
.2V~3.8V
.9V~1.9V
V~0.6V

Tuner Voltage Chart

Enable, Data, and Clock have no DC readings. They are digital signals from the MPU.

NOTE: Voltage at the 30V test pin varies with channel selection. Refer to chart for sample tuning voltages of TV/CATV(CABLE) channels as shown.

Voltage Reading Are Nominal And May Vary ± 15%

- VHF -	
Ch. 02	4.0V
Ch. 06	8.2V
Ch. 07	7.0V
Ch. 13	9.3V

- UHF -	
Ch. 14	7.7V
Ch. 69	24V

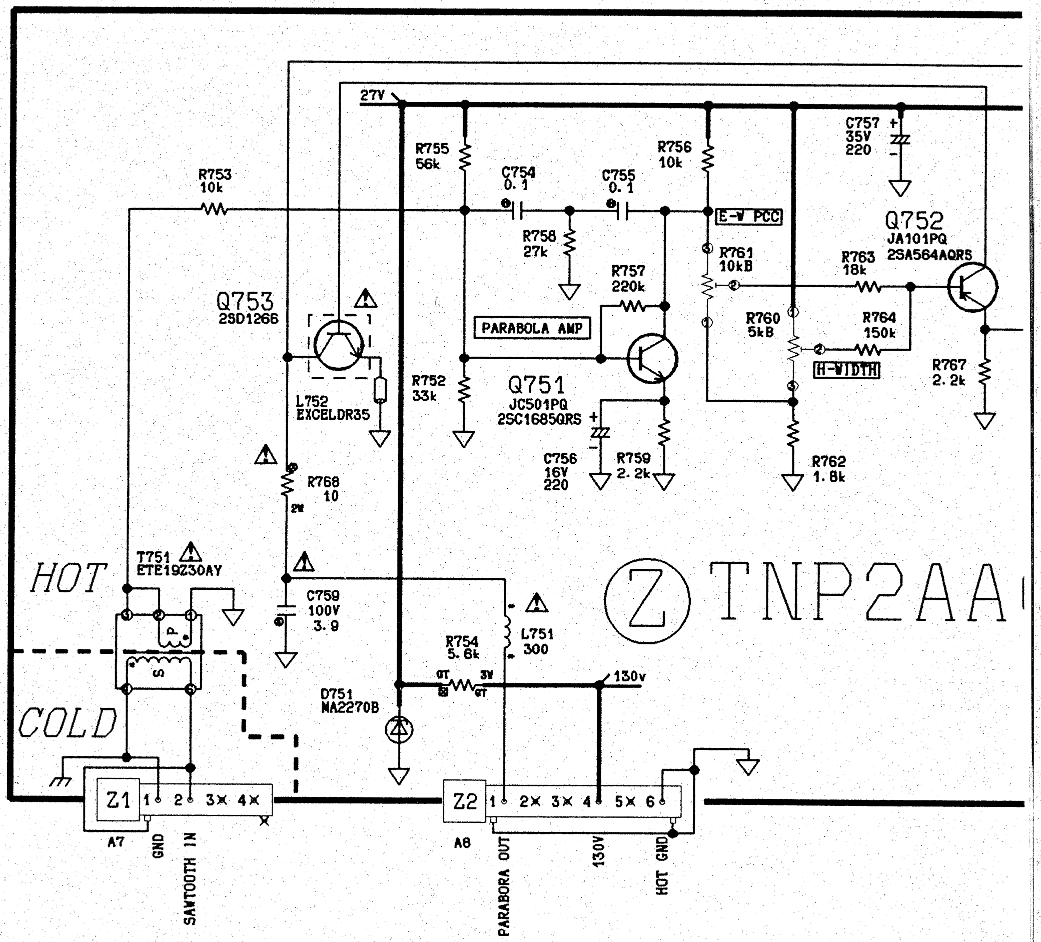
- CABLE -					
1st Band		2nd Band		3rd Band	
Ch. 1	6.7V	Ch. 16	4.5V	Ch. 47	3.7V
Ch. 15	24.7V	Ch. 46	2.70V	Ch. 94	14.9V
Ch. 95	9.8V			Ch. 100	15.1V
Ch. 99	17.5V			Ch. 125	24.0V

MICROPROCESSOR PROGRAMMING FOR BAND TUNING/SWITCHING

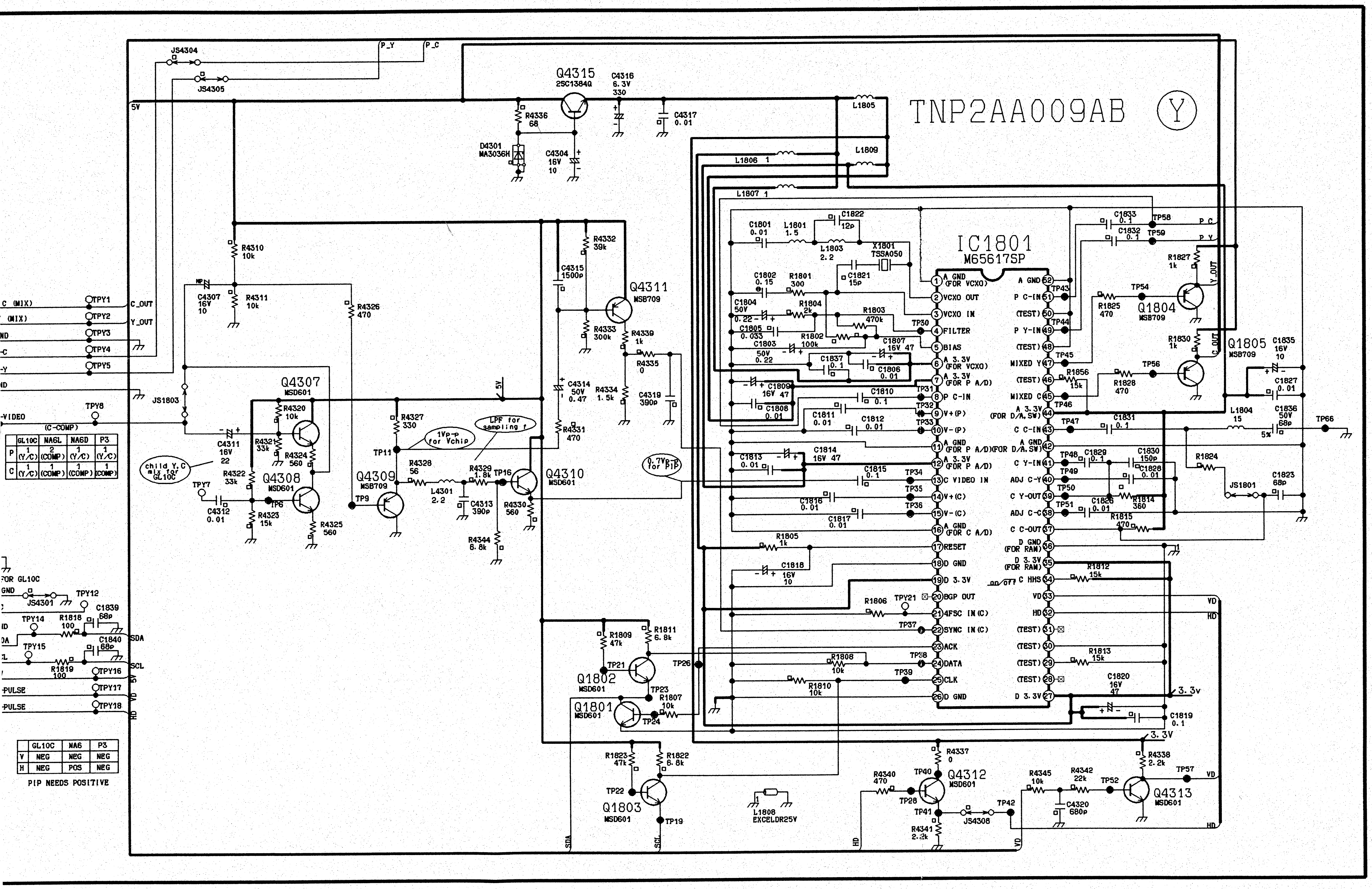
	54MHz ←→ 130MHz	130MHz ←→ 360MHz	360MHz ←→ 806MHz
	FIRST TUNING BAND	SECOND TUNING BAND	THIRD TUNING BAND
VHF	02~06	07~13	
UHF			14~69
CABLE	01~06,14,15, 95~99	07~13, 16~46	47~94, 100~125

NOTE: CABLE channel numbers as recommended by the joint EIA/NCTA Engineering Committee and published as EIA INTERIM STANDARD NO. 6 – CABLE TELEVISION CHANNEL IDENTIFICATION PLAN – MAY 1983.

Z–Board Schematic (All Models)


27V
R753 10k
R755 56k
C754 0.1
C755 0.1
R756 10k
C757 35V 220
E-W PCC
Q752 JA101PQ 2SA564AQRS
R758 27k
R757 220k
R761 10kB
R763 18k
Q753 2SD1266
PARABOLA AMP
R760 5kB
R764 150k
H-WIDTH
R767 2.2k
L752 EXCELDR35
R752 33k
Q751 JC501PQ 2SC1685QRS
C756 16V 220
R759 2.2k
R762 1.8k
R768 10 2W
HOT
COLD
T751 ETE19Z30AY
C759 100V 3.9
L751 300
R754 5.6k
130V
D751 MA2270B
Z TNP2AA
Z1 1 2 3 4
A7
GND
SAWTOOTH IN
Z2 1 2 3 4 5 6
A8
PARABORA OUT
130V
HOT GND

Y-Board Schematic
CT-32G22V/UV/CV


TNP2AA009AB
Y
IC1801
M65617SP
Q4315
2SC1384Q
Q4311
MSB709
Q4307
MSD601
Q4308
MSD601
Q4309
MSB709
Q4310
MSD601
Q1804
MSB709
Q1805
MSB709
Q1802
MSD601
Q1801
MSD601
Q1803
MSD601
Q4312
MSD601
Q4313
MSD601
X1801
TSSA050
D4301
MA3036H
L1808
EXCELDR25V
L1805
L1806
L1807
L1809
L1804
JS4304
JS4305
JS1803
JS4301
JS1801
JS4308
5V
3.3V
P_Y
P_C
C_OUT
Y_OUT
SDA
SCL
VD
HD
(C-COMP)
child Y.C mix for GL10C
1Vp-p for Vchip
LPF for sampling f
0.7Vp-p for PIP
1 A GND (FOR VCXO)
2 VCXO OUT
3 VCXO IN
4 FILTER
5 BIAS
6 A 3.3V (FOR VCXO)
7 A 3.3V (FOR P A/D)
8 P C-IN
9 V+(P)
10 V-(P)
11 A GND (FOR P A/D)
12 A 3.3V (FOR P A/D)
13 C VIDEO IN
14 V+(C)
15 V-(C)
16 A GND (FOR C A/D)
17 RESET
18 D GND
19 D 3.3V
20 BGP OUT
21 4FSC IN(C)
22 SYNC IN(C)
23 ACK
24 DATA
25 CLK
26 D GND
27 D 3.3V
28 (TEST)
29 (TEST)
30 (TEST)
31 (TEST)
32 HD
33 VD
34 C HHS
35 D 3.3V (FOR RAM)
36 D GND (FOR RAM)
37 C C-OUT
38 ADJ C-C
39 C Y-OUT
40 ADJ C-Y
41 C Y-IN
42 A GND (FOR D/A, SW)
43 C C-IN
44 A 3.3V (FOR D/A, SW)
45 MIXED C
46 (TEST)
47 MIXED Y
48 (TEST)
49 P Y-IN
50 (TEST)
51 P C-IN
52 A GND
TPY1
TPY2
TPY3
TPY4
TPY5
TPY7
TPY8
TPY12
TPY14
TPY15
TPY16
TPY17
TPY18
C (MIX)
(MIX)
-VIDEO
-PULSE
-PULSE
FOR GL10C

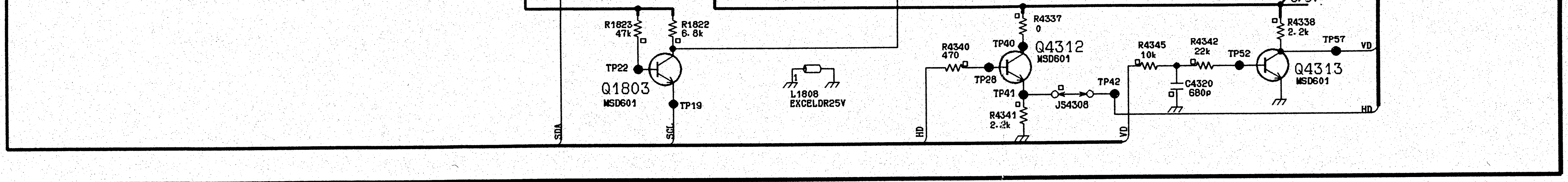
	GL10C	NA6L	NA6D	P3
P	1 (Y/C)	2 (COMP)	1 (Y/C)	1 (Y/C)
C	1 (Y/C)	1 (COMP)	1 (COMP)	1 (COMP)

	GL10C	NA6	P3
V	NEG	NEG	NEG
H	NEG	POS	NEG

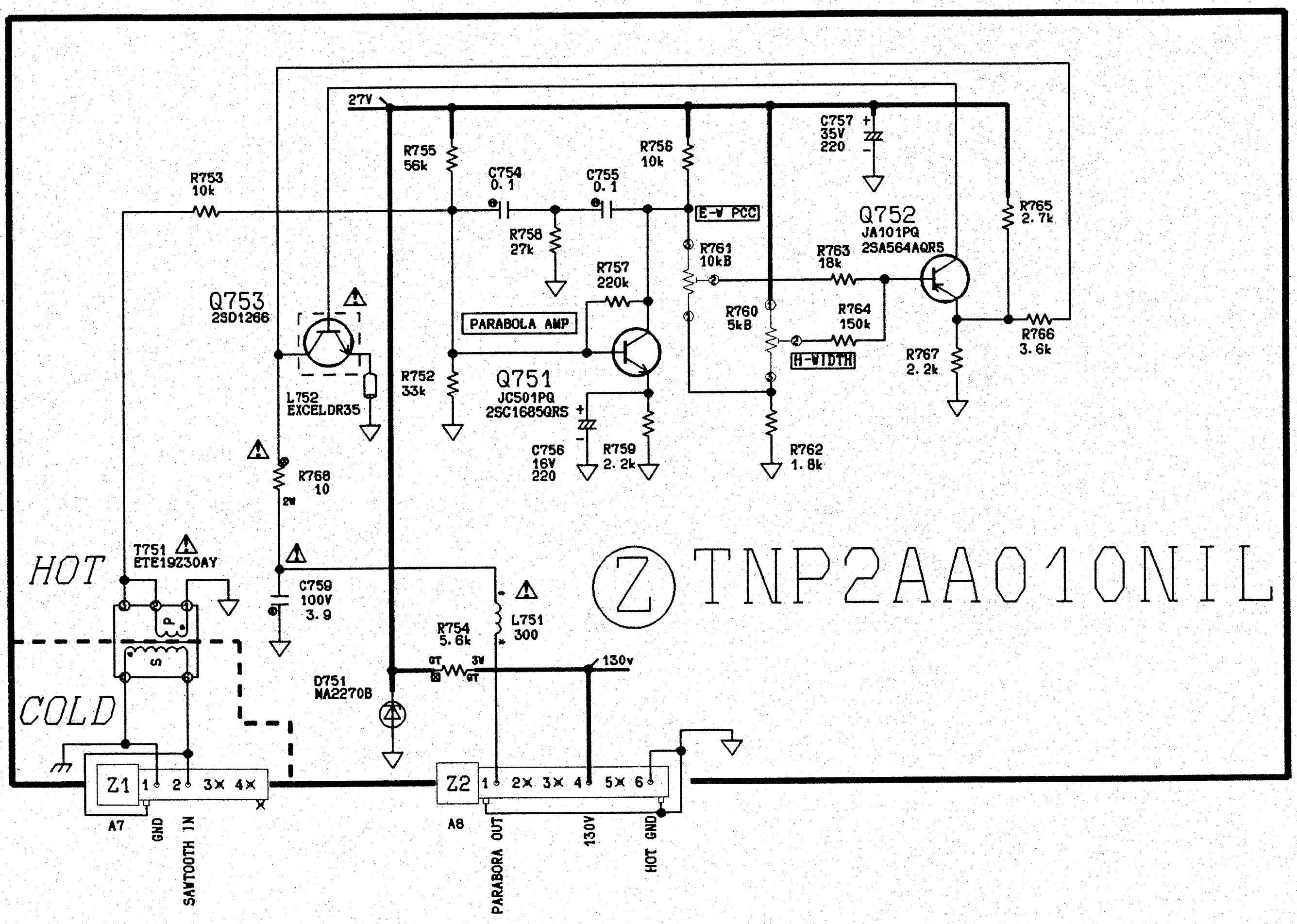
PIP NEEDS POSITIVE

	GL10C	NA6	P3
V	NEG	NEG	NEG
H	NEG	POS	NEG

PIP NEEDS POSITIVE


R1823
47k
R1822
6.8k
TP22
Q1803
MSD601
TP19
SDA
SCL
L1808
EXCELDR25V
HD
R4340
470
TP40
TP28
TP41
R4337
0
Q4312
MSD601
R4341
2.2k
J54308
TP42
VD
R4345
10k
C4320
680p
R4342
22k
TP52
R4338
2.2k
Q4313
MSD601
TP57
VD
HD

Z–Board Schematic
(All Models)


27V
R753
10k
R755
56k
C754
0.1
C755
0.1
R756
10k
C757
35V
220
R758
27k
E-W PCC
R761
10kB
Q752
JA101PQ
2SA564AQRS
R763
18k
R765
2.7k
R757
220k
PARABOLA AMP
R760
5kB
R764
150k
H-WIDTH
R766
3.6k
R767
2.2k
Q753
2SD1266
L752
EXCELDR35
R752
33k
Q751
JC501PQ
2SC1685QRS
C756
16V
220
R759
2.2k
R762
1.8k
R768
10
2W
HOT
COLD
T751
ETE19Z30AY
C759
100V
3.9
L751
300
R754
5.6k
3W
130v
D751
MA2270B
Z TNP2AA010NIL
Z1
1
2
3×
4×
A7
GND
SAWTOOTH IN
Z2
1
2×
3×
4
5×
6
A8
PARABORA OUT
130V
HOT GND

IMPORTANT SAFETY NOTICE

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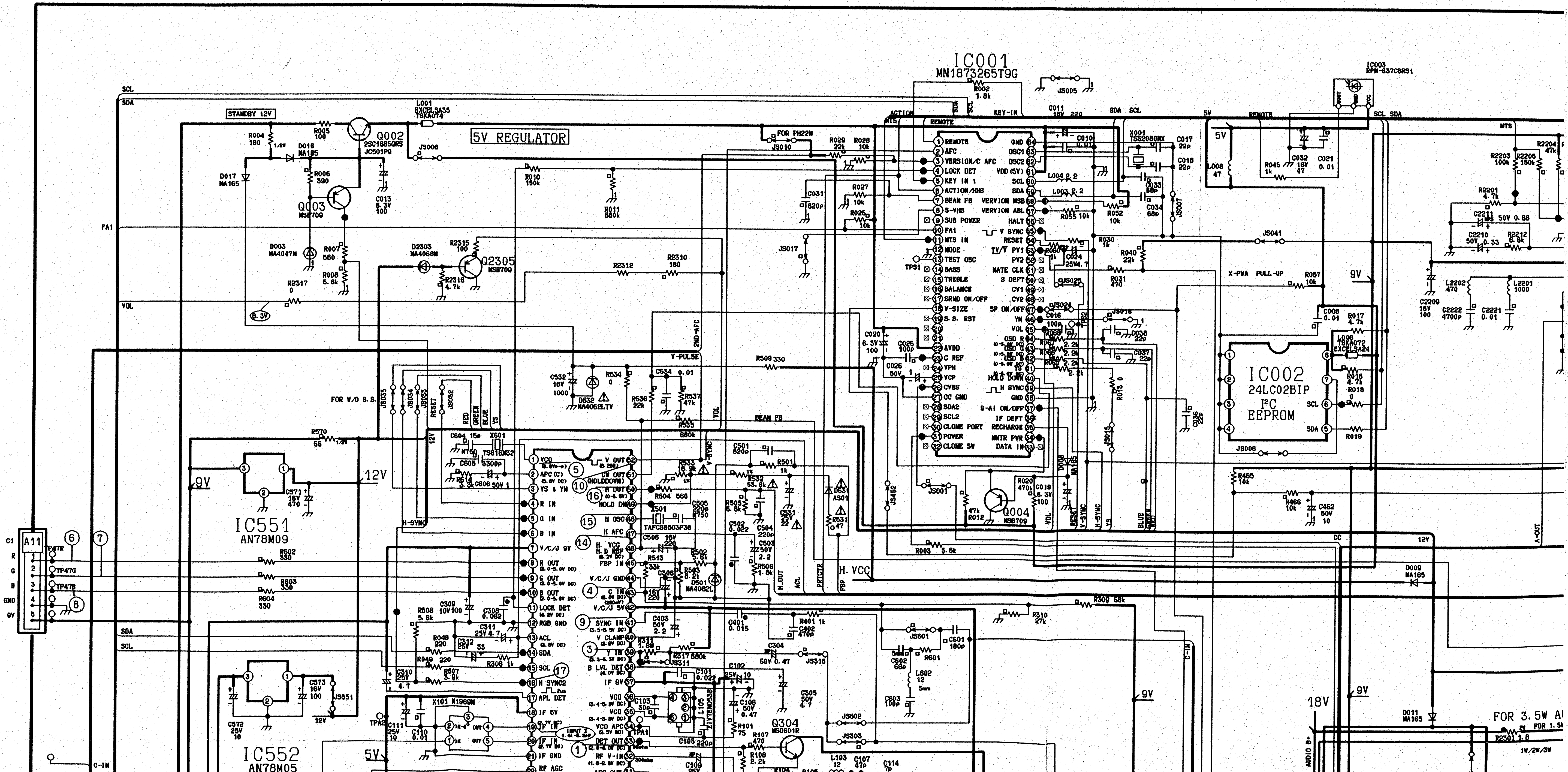
Board Index

"A"–Board – Main Chassis
"C"–Board – CRT Board
"X"–Board – Input/Output Jacks, A/V Switch
"Y"–Board – PIP Processing (CT–32G22V/UV/CV only)
"Z"–Board – Pin Cushion Board

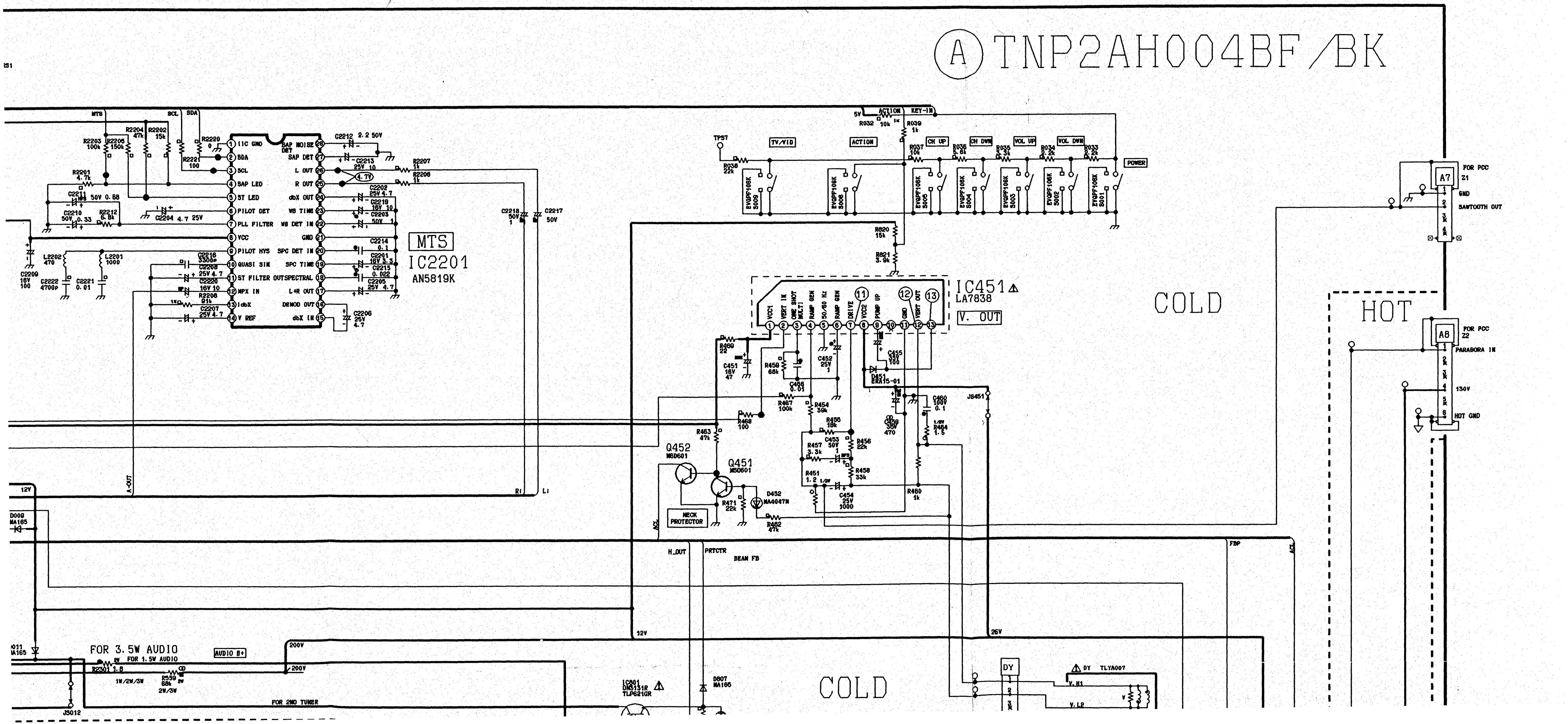
A B C D

A–Board Schemati
CT–32G12V/UV/C

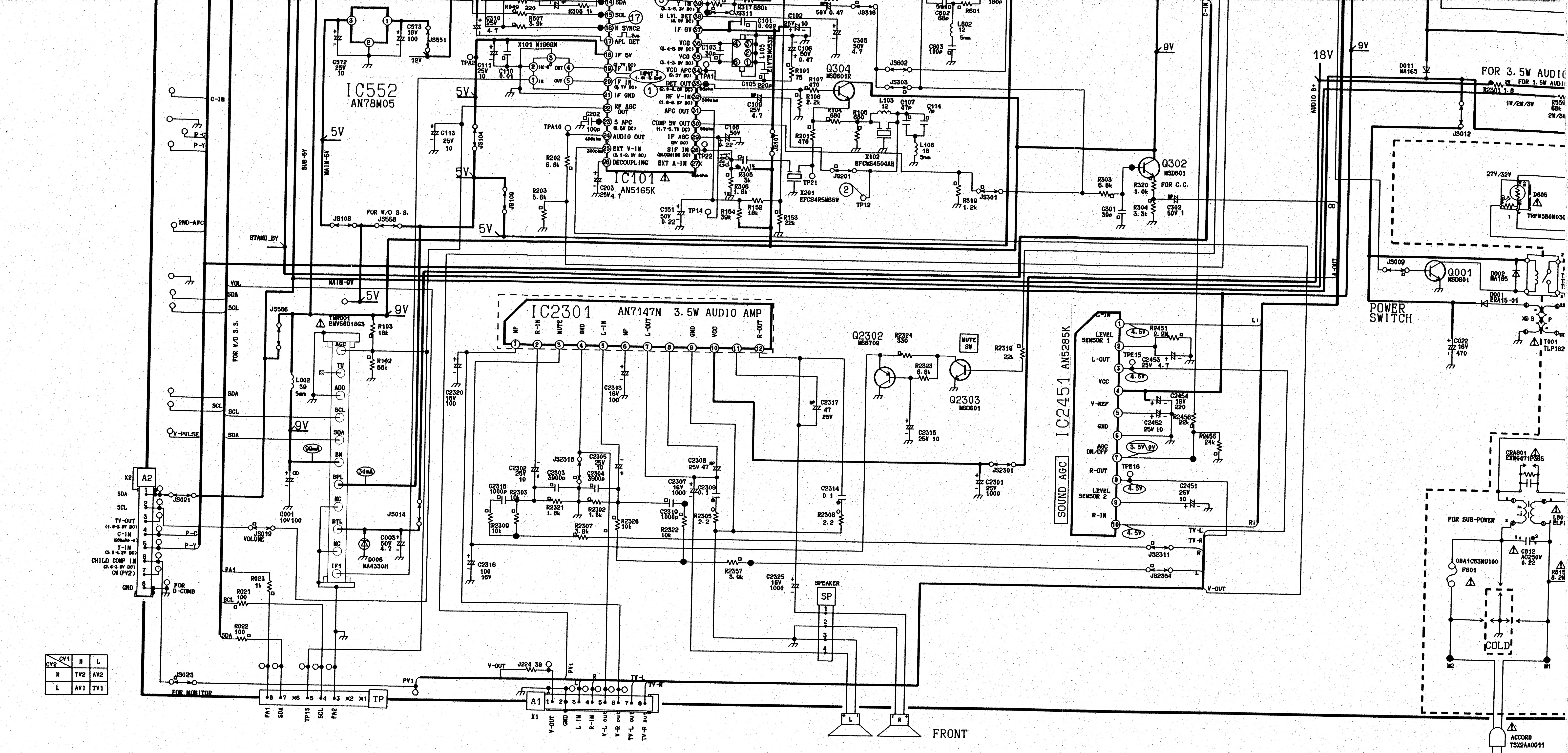

IC001
MN1873265T9G
REMOTE
AFC
VERSION/C AFC
LOCK DET
KEY IN 1
ACTION/HHS
BEAM FB
S-VHS
SUB POWER
FA1
MTS IN
MODE
TEST OSC
BASS
TREBLE
BALANCE
SRND ON/OFF
V-SIZE
S.S. RST
AVDD
C REF
VPH
VCP
CVBS
CC GND
SDA2
SCL2
CLONE PORT
POWER
CLONE SW
GND
OSC1
OSC2
VDD (5V)
SCL
SDA
VERSION MSB
VERSION ABL
HALT
V SYNC
RESET
PY1
PY2
MATE CLK
S DEFT
CY1
CY2
SP ON/OFF
YM
VOL
OSD R
OSD G
OSD B
H SYNC
HOLD DOWN
GND
S-AI ON/OFF
IF DEFT
RECHARGE
MNTR PWR
DATA IN
IC002
24LC02BIP
I²C
EEPROM
IC003
RPM-637CBRS1
IC551
AN78M09
IC552
AN78M05
5V REGULATOR
STANDBY 12V
Q002
2SC1685QRS
Q003
MSB709
Q2305
MSB709
Q004
MSB709
Q304
X001
X601
X101
12V
9V
5V
18V
SCL
SDA
VOL
FA1
REMOTE
KEY-IN
X-PWA PULL-UP
V-PULSE
BEAM FB
H-SYNC
H.VCC
FOR W/O S.S.
FOR PH22N
FOR 3.5W
A11
C-IN
RED
GREEN
BLUE
YS

E | F | G | H

ard Schematic
2G12V/UV/CV



Ⓐ TNP2AH004BF/BK
MTS
IC2201
AN5819K
IIC GND
SDA
SCL
SAP LED
ST LED
PILOT DET
PLL FILTER
VCC
PILOT HYS
QUASI SIN
ST FILTER
MPX IN
IdbX
V REF
SAP NOISE DET
SAP DET
L OUT
R OUT
dbX OUT
WB TIME
WB DET IN
GND
SPC DET IN
SPC TIME
OUTSPECTRAL
L+R OUT
DEMOD OUT
dbX IN
MTS
SCL
SDA
4.7V
IC451
LA7838
V. OUT
VCC1
VERT IN
ONE SHOT MULTI
RAMP GEN
50/60 Hz
RAMP GEN
DRIVE
VCC2
PUMP UP
GND
VERT OUT
5V
ACTION
KEY-IN
TP57
TV/VID
ACTION
CH UP
CH DWN
VOL UP
VOL DWN
POWER
EVQPF106K
COLD
HOT
A7
FOR PCC
Z1
GND
SAWTOOTH OUT
A8
FOR PCC
Z2
PARABORA IN
130V
HOT GND
Q452
MSD601
Q451
MSD601
D452
MA4047M
NECK PROTECTOR
JS451
H_OUT
PRTCTR
BEAM FB
FBP
ACL
A-OUT
12V
26V
D009
MA165
D011
MA165
FOR 3.5W AUDIO
FOR 1.5W AUDIO
AUDIO B+
200V
R2301 1.8
R559 68k
FOR 2ND TUNER
JS012
IC801
ON3131R
TLP621GR
D807
MA165
COLD
DY
DY TLYA007
V.H1
V.L2


IC552
AN78M05
IC101
AN5165K
X101 N1969N
Q304
MSD601R
X102
EFCW54504AB
X201
EFCS4R5M6W
Q302
MSD601
FOR C.C.
18V
9V
5V
12V
FOR 3.5W AUDIO
FOR 1.5W AUDIO
AUDIO B+
D011
MA165
J5012
27V/32V
D805
TRPW5B0N030
J5009
Q001
MSD601
D002
MA165
D001
ERA15-01
POWER SWITCH
C022
16V
470
T001
TLP162
C-IN
P-C
P-Y
2ND-AFC
STAND_BY
SUB-5V
MAIN-5V
JS108
FOR W/O S.S.
JS558
JS104
JS109
VOL
SDA
SCL
MAIN-9V
JS566
FOR W/O S.S.
TNR001
ENV56D18G3
AGC
TU
ADD
SCL
SDA
BM
BPL
NC
BTL
NC
IF1
L002
R103
18k
R102
68k
C001
10V 100
D006
MA4330H
C003
50V
4.7
J5014
V-PULSE
IC2301
AN7147N 3.5W AUDIO AMP
NF
R-IN
MUTE
GND
L-IN
NF
L-OUT
GND
VCC
R-OUT
C2320
16V
100
C2313
16V
100
C2317
47
25V
C2316
100
16V
C2325
16V
1000
Q2302
MSB709
R2324
330
R2323
6.8k
Q2303
MSD601
MUTE SW
R2319
22k
C2315
25V 10
JS2301
C2301
25V
1000
IC2451 AN5285K
SOUND AGC
LEVEL SENSOR 1
L-OUT
VCC
V-REF
GND
AGC ON/OFF
R-OUT
LEVEL SENSOR 2
R-IN
4.5V
3.5V(0V)
R2451
2.2M
C2453
25V 4.7
C2454
16V
220
C2452
25V 10
R2456
22k
R2455
24k
C2451
25V
10
TPE15
TPE16
JS2311
JS2364
TV-L
TV-R
V-OUT
SPEAKER
SP
L
R
FRONT
X2
A2
SDA
SCL
TV-OUT
C-IN
Y-IN
CHILD COMP IN
CV (PV2)
GND
FOR D-COMB
VOLUME
JS019
JS021
FA1
R023
1k
R021
100
R022
100
JS023
FOR MONITOR
PV1
TP
FA1
SDA
TP15
SCL
FA2
V-OUT
J224 39
A1
X1
V-OUT
GND
L IN
R IN
V-L out
V-R out
TV-L out
TV-R out
FOR SUB-POWER
CRA801
EXNG471P335
0BA1063MU100
F801
C812
AC250V
0.22
COLD
M2
M1
ACCORD
TSX2AA0011

CV2 \ CV1	H	L
H	TV2	AV2
L	AV1	TV1

IMPORTANT SAFETY NOTICE

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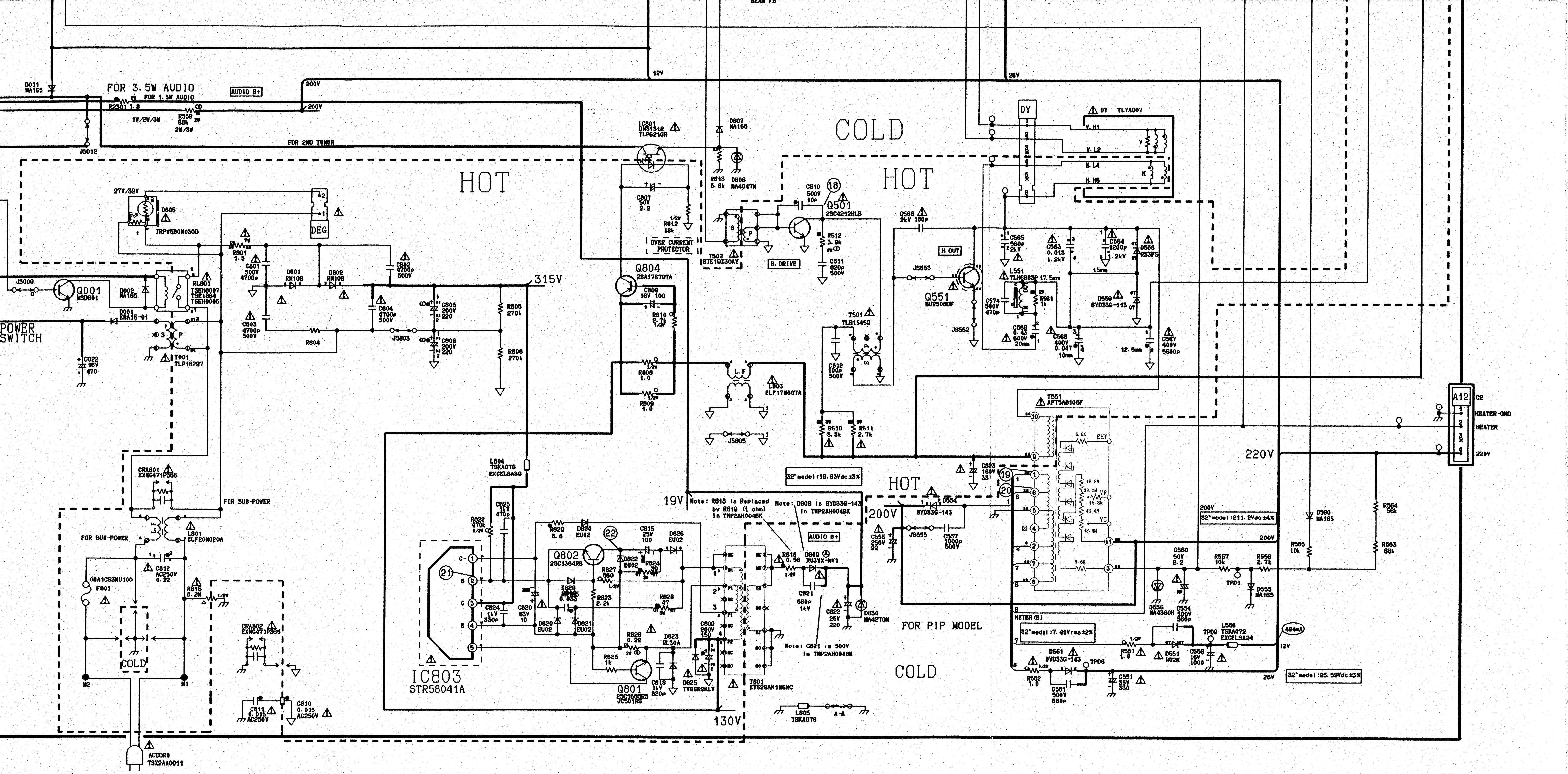
FOR 3.5W AUDIO
AUDIO B+
FOR 2ND TUNER
HOT
COLD
DY
DEG
POWER SWITCH
Q001
IC801
Q501
2SC4212HLB
H. DRIVE
H. OUT
Q551
BU2506DF
Q804
2SA1787QTA
315V
T501
TLH15452
T551
KFT5AB106F
A12
HEATER-GND
HEATER
220V
OVER CURRENT PROTECTOR
T502
ETE19Z30AY
L803
ELF17N007A
FOR SUB-POWER
L801
ELF20N020A
T001
TLP16297
IC803
STR58041A
Q802
2SC1384RS
Q801
2SC1685RS
T801
ETS29AK1N6NC
19V
130V
200V
FOR PIP MODEL
Note: R818 is Replaced by R819 (1 ohm) In TNP2AH004BK
Note: D809 is BYD33G-143 In TNP2AH004BK
Note: C821 is 500V In TNP2AH004BK
32" model : 19.83Vdc ±3%
32" model : 211.2Vdc ±4%
32" model : 7.40Vrms ±2%
32" model : 25.59Vdc ±3%
ACCORD
TSX2AA0011
12V
26V

RTANT SAFETY NOTICE
IATIC DIAGRAM INCORPORATES SPECIAL
AT ARE IMPORTANT FOR PROTECTION FROM
FIRE AND ELECTRICAL SHOCK HAZARDS.
VICING IT IS ESSENTIAL THAT ONLY
ERS SPECIFIED PARTS BE USED FOR THE
MPONENTS DESIGNATED WITH A ⚠ IN THE

Board Index

"A"-Board – Main Chassis
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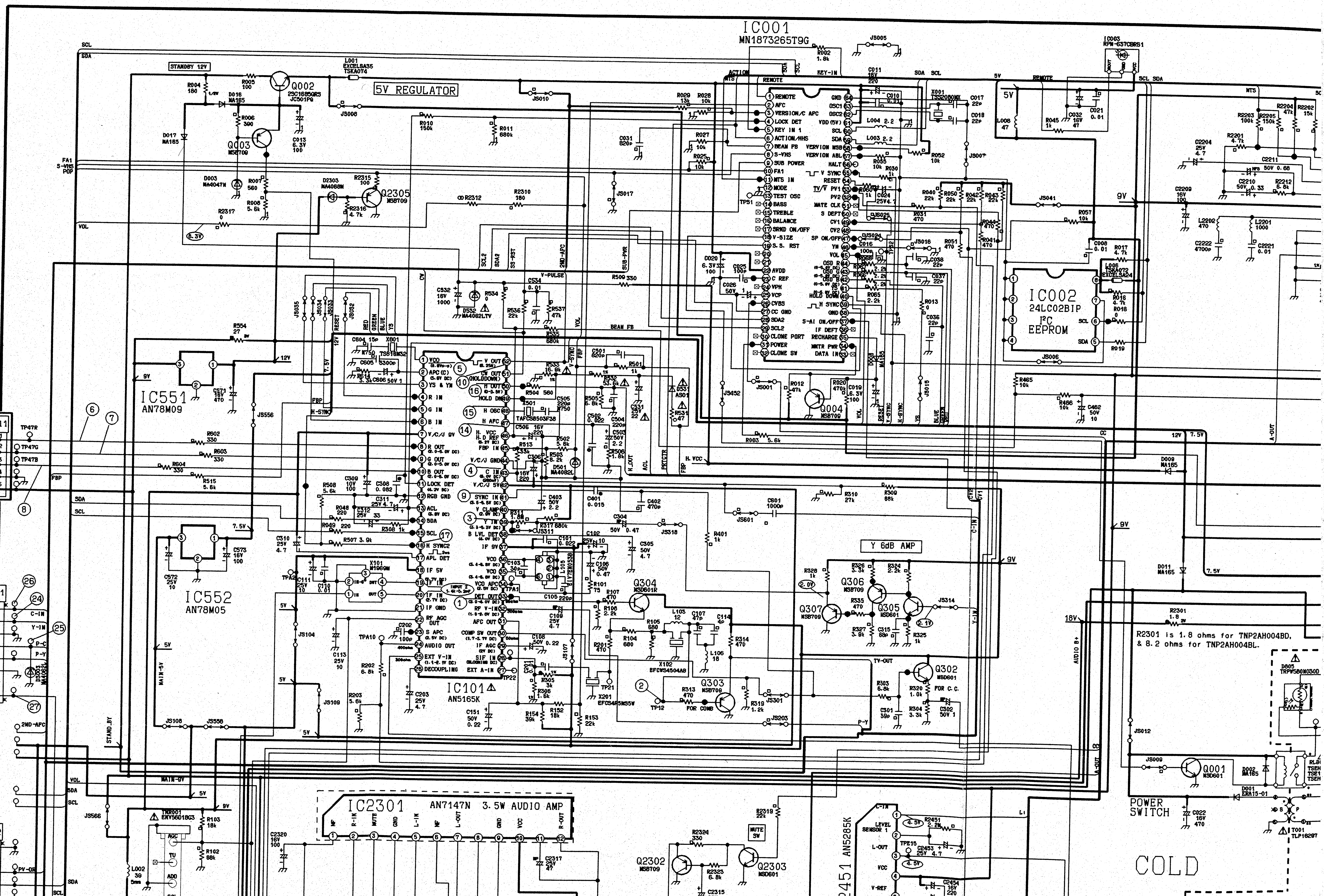
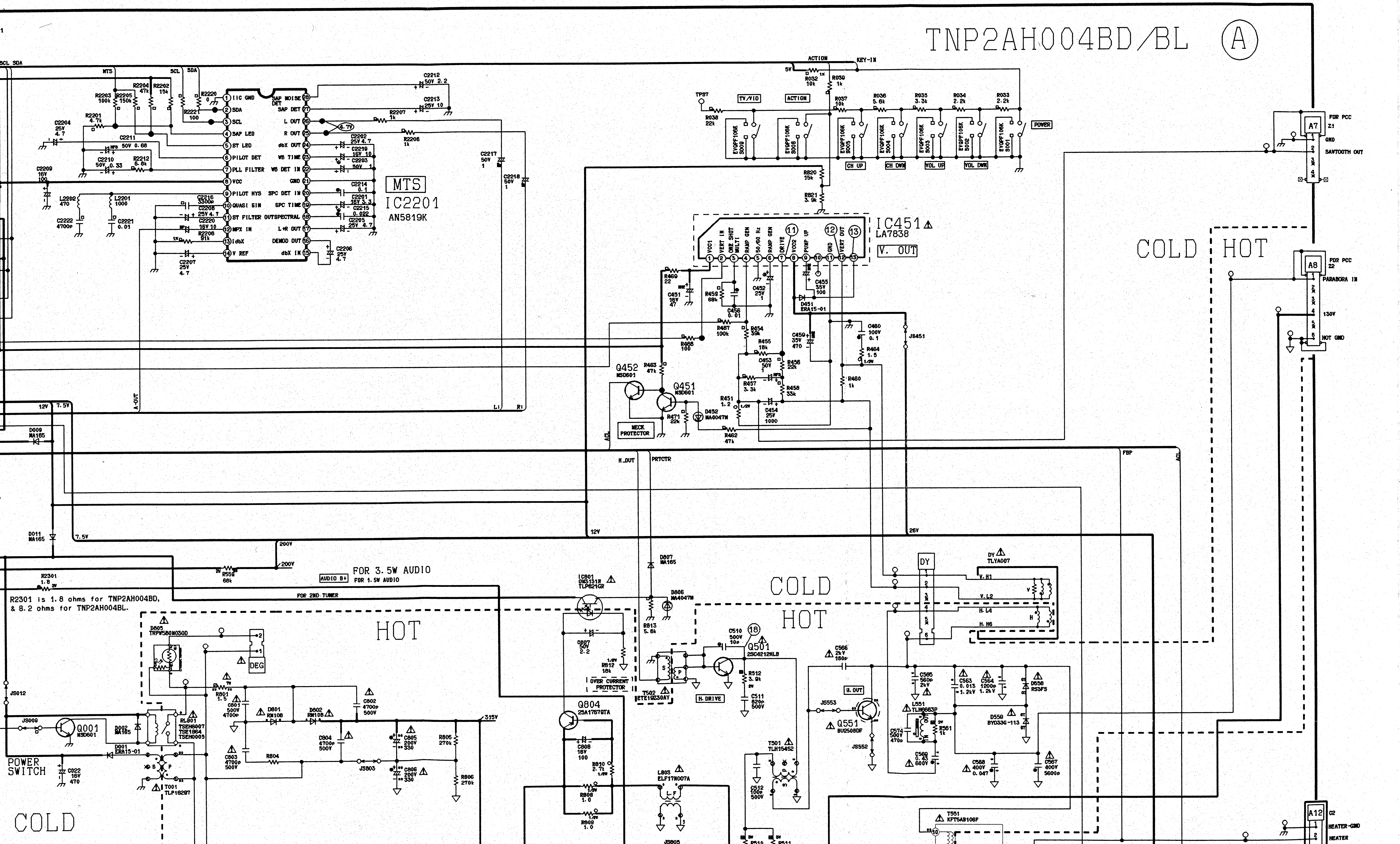
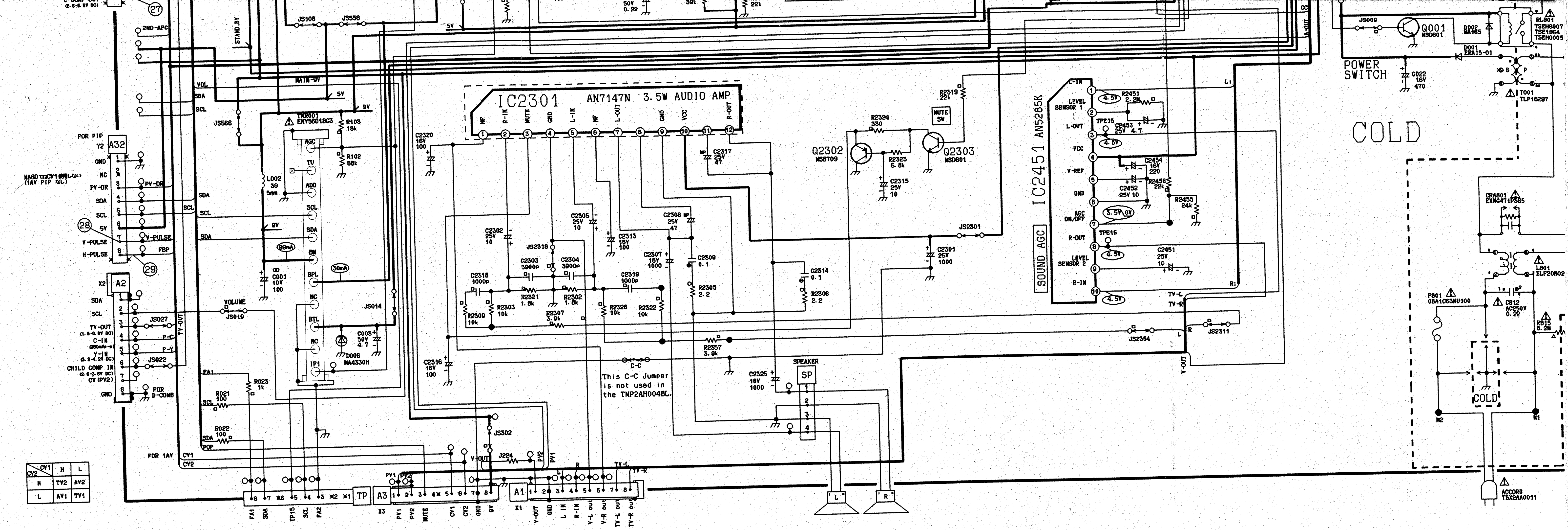

IC001
MN1873265T9G
5V REGULATOR
STANDBY 12V
Q002
2SC1685Q RS
Q003
MSB709
Q2305
MSB709
L001
EXCELSA35
TSKA074
IC002
24LC02BIP
I²C
EEPROM
IC003
RPM-637CBRS1
X001
TSS2080MX
IC551
AN78M09
IC552
AN78M05
IC101
AN5165K
Y 6dB AMP
Q304
MSD601R
Q306
MSB709
Q305
MSD601
Q307
MSB709
Q302
MSD601
Q303
MSB709
Q004
MSB709
Q001
MSD601
X101
X102
EFCWS4504AB
X201
EFCS4R5MS5W
IC2301
AN7147N 3.5W AUDIO AMP
Q2302
MSB709
Q2303
MSD601
MUTE SW
AN5285K
POWER SWITCH
COLD
A11
A31
A32
FOR PIP
TNR001
ENV56D18G3
D805
TRPW580M030D
T001
TLP16297
REMOTE
AFC
VERSION/C AFC
LOCK DET
KEY IN 1
ACTION/HHS
BEAM FB
S-VHS
SUB POWER
FA1
MTS IN
MODE
TEST OSC
BASS
TREBLE
BALANCE
SRND ON/OFF
V-SIZE
S. S. RST
AVDD
C REF
VPH
VCP
CVBS
CC GND
SDA2
SCL2
CLONE PORT
POWER
CLONE SW
GND
OSC1
OSC2
VDD (5V)
SCL
SDA
VERSION MSB
VERSION ABL
HALT
V SYNC
RESET
PV1
PV2
MATE CLK
S DEPT
CV1
CV2
SP ON/OFF
YM
VOL
OSD R
OSD G
OSD B
OSD Ys
HOLD DOWN
H SYNC
S-AI ON/OFF
IF DEFT
RECHARGE
MNTR PWR
DATA IN
VCO
APC (C)
YS & YM
R IN
G IN
B IN
V/C/J 9V
R OUT
G OUT
B OUT
LOCK DET
RGB GND
ACL
SDA
SCL
H SYNC2
APL DET
IF 5V
IF IN
IF GND
RF AGC OUT
S APC
AUDIO OUT
EXT V-IN
DECOUPLING
V OUT
CW OUT (HOLDDOWN)
H OUT
HOLD DN
H OSC
H AFC
H. VCC
H.D REF
FBP IN
V/C/J GND
C IN
V/C/J 5V
SYNC IN
Y CLAMP
Y IN
B LVL DET
IF SW
VCO APC
DET OUT
RF V-IN
AFC OUT
COMP SW OUT
IF AGC
SIF IN
EXT A-IN
SCL
SDA
VOL
MAIN-9V
STAND BY
2ND-AFC
SUB-PWR
BEAM FB
V-PULSE
H-SYNC
FBP
H. VCC
TV-OUT
FOR C.C.
FOR COMB
AUDIO 8+
A-OUT
C-IN
Y-IN
P-C OUT
P-Y OUT
C-COMP OUT
PV-OR
18V
9V
12V
7.5V
5V
6.3V

R2301 is 1.8 ohms for TNP2AH004BD,
& 8.2 ohms for TNP2AH004BL.


TNP2AH004BD/BL Ⓐ
MTS
IC2201
AN5819K
IIC GND
SDA
SCL
SAP LED
ST LED
PILOT DET
PLL FILTER
VCC
PILOT HYS
QUASI SIN
ST FILTER
MPX IN
IdbX
V REF
SAP NOISE DET
SAP DET
L OUT
R OUT
dbX OUT
WB TIME
WB DET IN
GND
SPC DET IN
SPC TIME
OUTSPECTRAL
L+R OUT
DEMOD OUT
dbX IN
ACTION
KEY-IN
TPS7
TV/VID
POWER
CH UP
CH DWN
VOL UP
VOL DWN
EVQPF106K
IC451
LA7838
V. OUT
VCC1
VERT IN
ONE SHOT MULTI
RAMP GEN
50/60 Hz
DRIVE
VCC2
PUMP UP
GND
VERT OUT
Q452
MSD601
Q451
MSD601
NECK PROTECTOR
D452
MA4047M
JS451
A7
FOR PCC
GND
SAWTOOTH OUT
A8
PARABORA IN
130V
HOT GND
COLD
HOT
H_OUT
PRTCTR
FBP
ACL
12V
7.5V
26V
200V
D009
MA165
D011
MA165
R2301
1.8
R559
68k
AUDIO B+
FOR 3.5W AUDIO
FOR 1.5W AUDIO
FOR 2ND TUNER
R2301 is 1.8 ohms for TNP2AH004BD,
& 8.2 ohms for TNP2AH004BL.
D805
TRPW580M030D
DEG
IC801
ON3131R
TLP621GR
OVER CURRENT PROTECTOR
D807
MA165
D806
MA4047M
T502
ETE19Z30AY
H. DRIVE
Q501
2SC4212MLB
H. OUT
Q551
BU2508DF
JS553
JS552
DY
TLYA007
V.H1
V.L2
H.L4
H.H6
L551
TLH6663P
D559
BYD33G-113
D558
RS3FS
T501
TLH15452
Q804
2SA1767QTA
L803
ELF17N007A
JS805
T551
KFT5AB106F
A12
HEATER-GND
HEATER
Q001
MSD601
D002
MA165
D001
ERA15-01
RL801
TSEH8007
TSE1864
TSEH0005
T001
TLP16297
POWER SWITCH
JS012
JS009
JS803
D801
RM10B
D802
RM10B
315V
COLD
HOT


IC2301 AN7147N 3.5W AUDIO AMP
IC2451 AN5285K
SOUND AGC
Q2302 MS8709
Q2303 MSD601
Q001 MSD601
POWER SWITCH
COLD
SPEAKER
SP
A32
A2
A3
A1
TP
FOR PIP
VOLUME
This C-C Jumper is not used in the TNP2AH004BL.
CY1
CY2
H
L
TV2
AV2
AV1
TV1
ACCORD TSX2AA0011

Board Index

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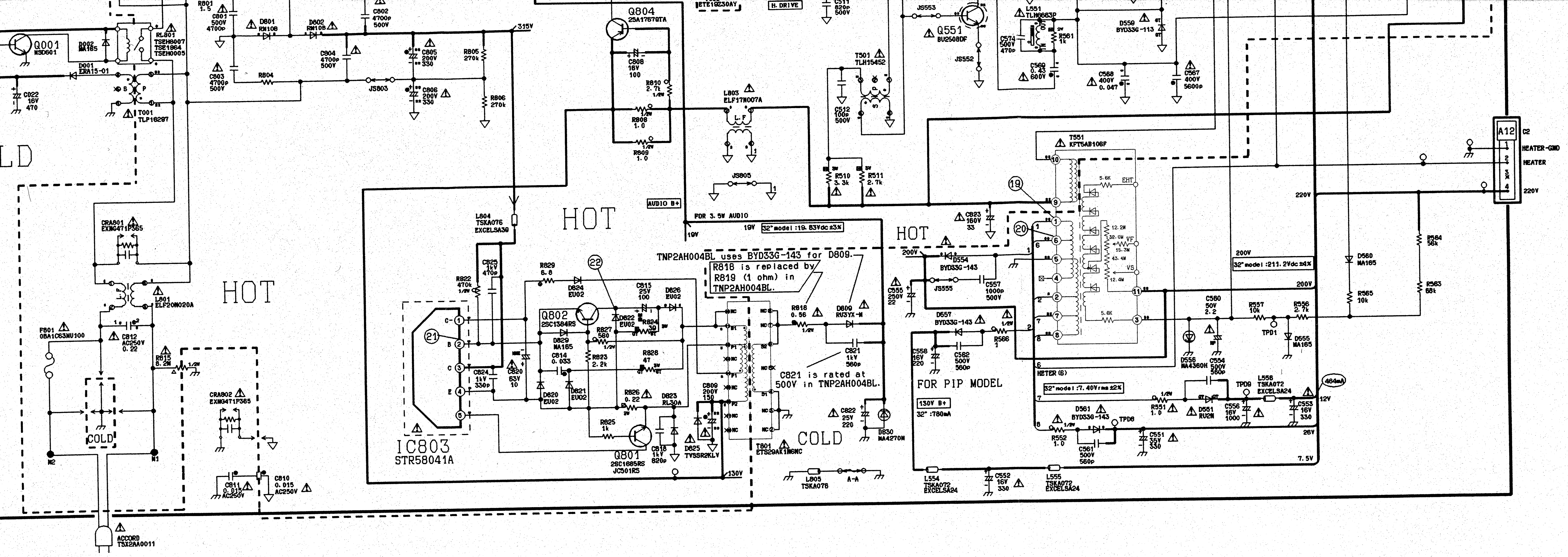
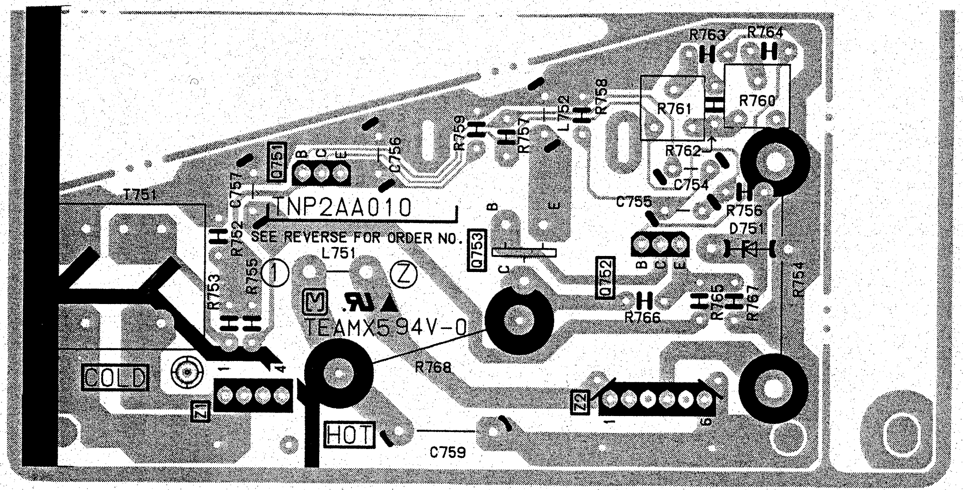
IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A ⚠ IN THE SCHEMATIC.

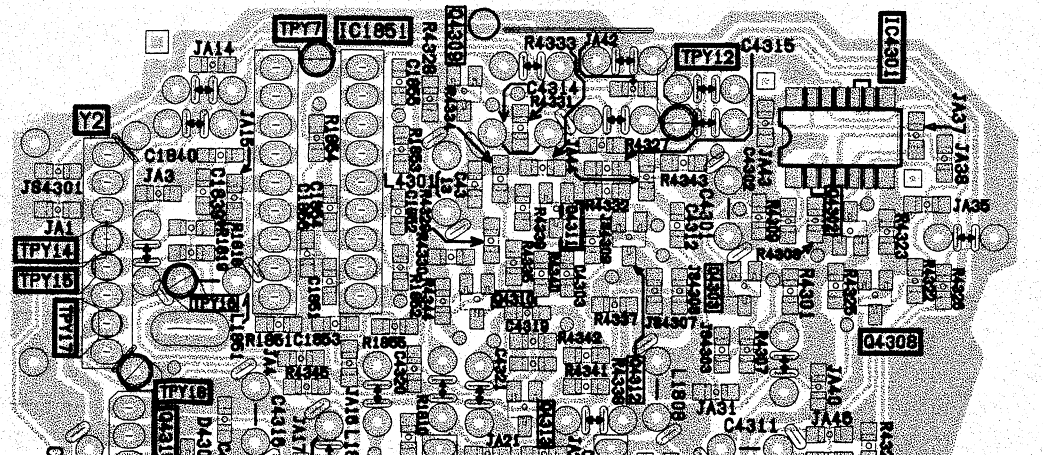

Q001
NSD601
D002
MA165
RL801
TSEH6007
TSE1864
TSEH0005
D001
ERA15-01
C022
16V
470
T001
TLP16297
R801
1.5
C801
500V
4700p
D801
RM10B
D802
RM10B
C802
4700p
500V
C803
4700p
500V
R804
C804
4700p
500V
C805
200V
330
C806
200V
330
JS803
R805
270k
R806
270k
315V
Q804
2SA1767QTA
C808
16V
100
R810
2.7k
R808
1.0
R809
1.0
L803
ELF17N007A
JS805
AUDIO B+
FOR 3.5W AUDIO
19V
32"model:19.83Vdc±3%
ETE19Z30AY
H.DRIVE
C511
820p
500V
T501
TLH15452
C512
100p
500V
R510
3.3k
R511
2.7k
JS553
Q551
BU2508DF
JS552
L551
TLH6663P
C574
500V
470p
R561
1k
C569
0.43
600V
D559
BYD33G-113
C568
400V
0.047
C567
400V
5600p
A12
C2
HEATER-GND
HEATER
220V
220V
T551
KFT5AB106F
EHT
5.6K
12.2M
32.0M
15.3M
43.4M
12.4M
VF
VS
5.6K
19
20
HOT
HOT
HOT
COLD
COLD
COLD
LD
CRA801
EXNG471P365
L801
ELF20N020A
F801
0BA1C63NU100
C812
AC250V
0.22
R815
8.2M
1/2W
CRA802
EXNG471P365
C811
0.015
AC250V
C810
0.015
AC250V
ACCORD
TSX2AA0011
L804
TSXA076
EXCELSA30
C825
1kV
470p
R822
470k
1/2W
R829
6.8
D824
EU02
22
Q802
2SC1384RS
D829
MA165
R827
560
C815
25V
100
D826
EU02
D822
EU02
R824
39
C814
0.033
R823
2.2k
R828
47
C820
63V
10
C824
1kV
330p
D820
EU02
D821
EU02
R826
0.22
D823
RL30A
R825
1k
Q801
2SC1685RS
JC501RS
C818
1kV
820p
D825
TVSSR2KLV
21
IC803
STR58041A
TNP2AH004BL uses BYD33G-143 for D809.
R818 is replaced by
R819 (1 ohm) in
TNP2AH004BL.
R818
0.56
D809
RU3YX-N
C821
1kV
560p
C821 is rated at
500V in TNP2AH004BL.
C809
200V
150
C822
25V
220
D830
MA4270M
T801
ETS29AK1N6MC
130V
L805
TSKA076
A-A
C823
160V
33
200V
D554
BYD33G-143
C557
1000p
500V
JS555
C555
250V
22
D557
BYD33G-143
R566
1
C558
16V
220
C562
500V
560p
FOR PIP MODEL
130V B+
32":780mA
200V
32"model:211.2Vdc±4%
200V
C560
50V
2.2
R557
10k
R556
2.7k
TPD1
D560
MA165
R565
10k
R564
56k
R563
68k
D556
MA4360H
C554
500V
560p
D555
MA165
HETER(6)
32"model:7.40Vrms±2%
TPD9
L556
TSKA072
EXCELSA24
464mA
12V
R551
1.0
D561
BYD33G-143
D551
RU2N
C556
16V
1000
C553
16V
330
TPD8
R552
1.0
C561
500V
560p
C551
35V
330
26V
7.5V
L554
TSKA072
EXCELSA24
C552
16V
330
L555
TSKA072
EXCELSA24

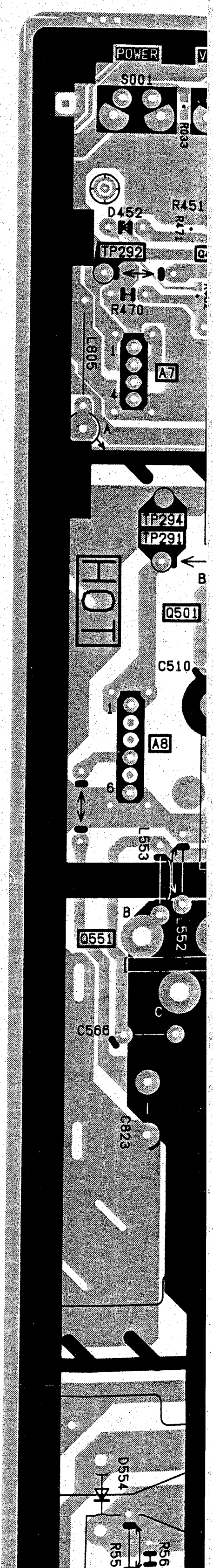
TANT SAFETY NOTICE
 DIAGRAM INCORPORATES SPECIAL
ARE IMPORTANT FOR PROTECTION FROM
RE AND ELECTRICAL SHOCK HAZARDS
NG IT IS ESSENTIAL THAT ONLY
S SPECIFIED PARTS BE USED FOR THE
NENTS DESIGNATED WITH A ⚠ IN THE

Z–Board Layout
TNP2AA010
(ALL MODELS)


R763
R764
R761
R760
R758
L752
R757
R759
C756
Q751
B C E
C757
T751
TNP2AA010
SEE REVERSE FOR ORDER NO.
R752
R753
R755
L751
①
Ⓩ
M
TEAMX594V-0
Q753
B
E
C
R762
C754
C755
R756
D751
Q752
B C E
R766
R765
R767
R754
R768
COLD
1
4
Z1
HOT
C759
Z2
1
6

Y–Board Layout
TNP2AA009
(CT–32G22V/UV/CV)

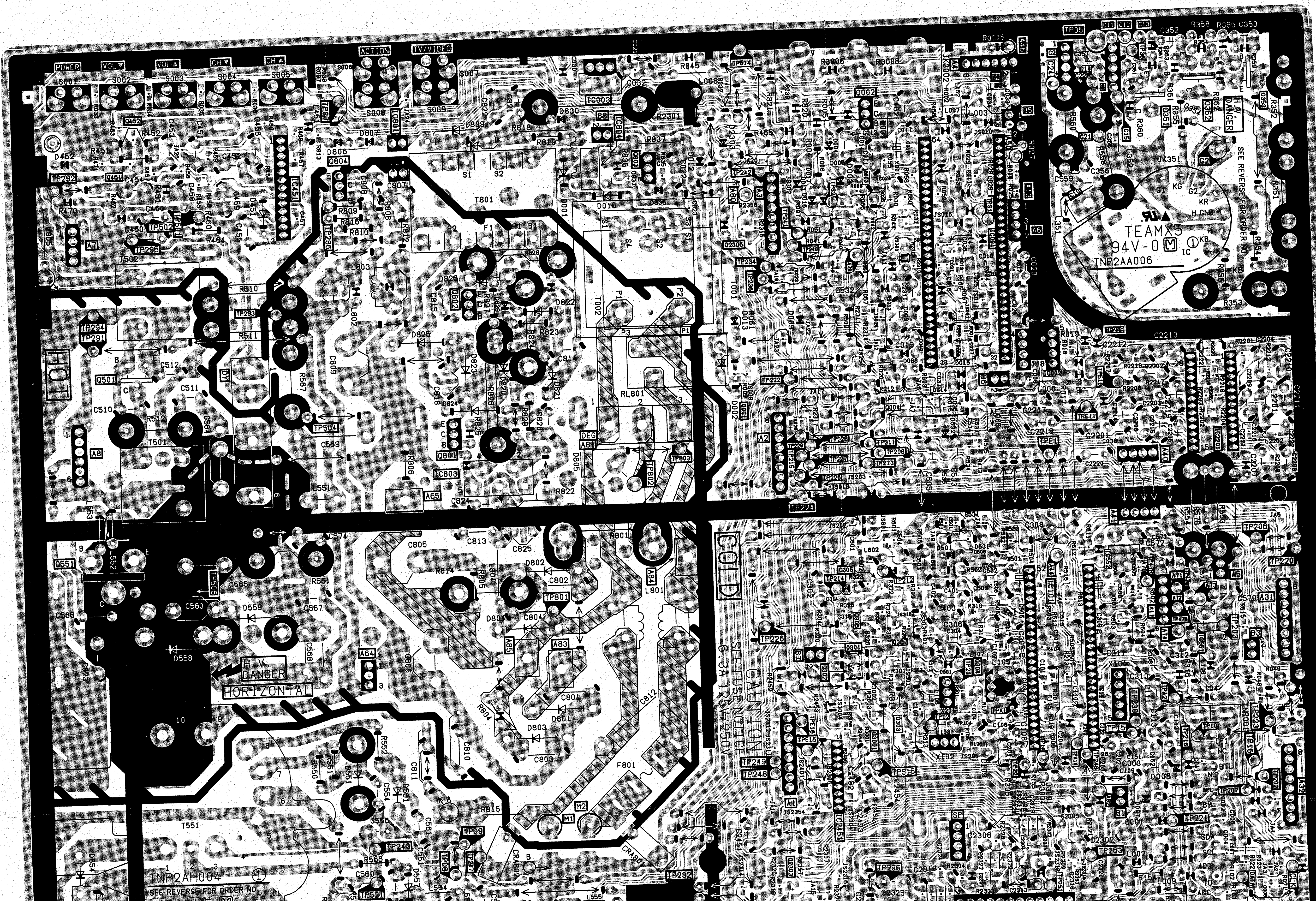

TPY7
IC1851
TPY12
C4315
IC4301
JA14
R4333
Y2
C1840
JA3
JB4301
JA1
TPY14
TPY16
TPY17
TPY18
L4301
R4327
R4343
R4303
R4301
R4341
R4342
Q4308
JA37
JA38
JA35
JA31
JA45
C4311
L1808
R1864
R1865
R1861
IC1853
R1855
R1854
C4310
Q4310
IC4310

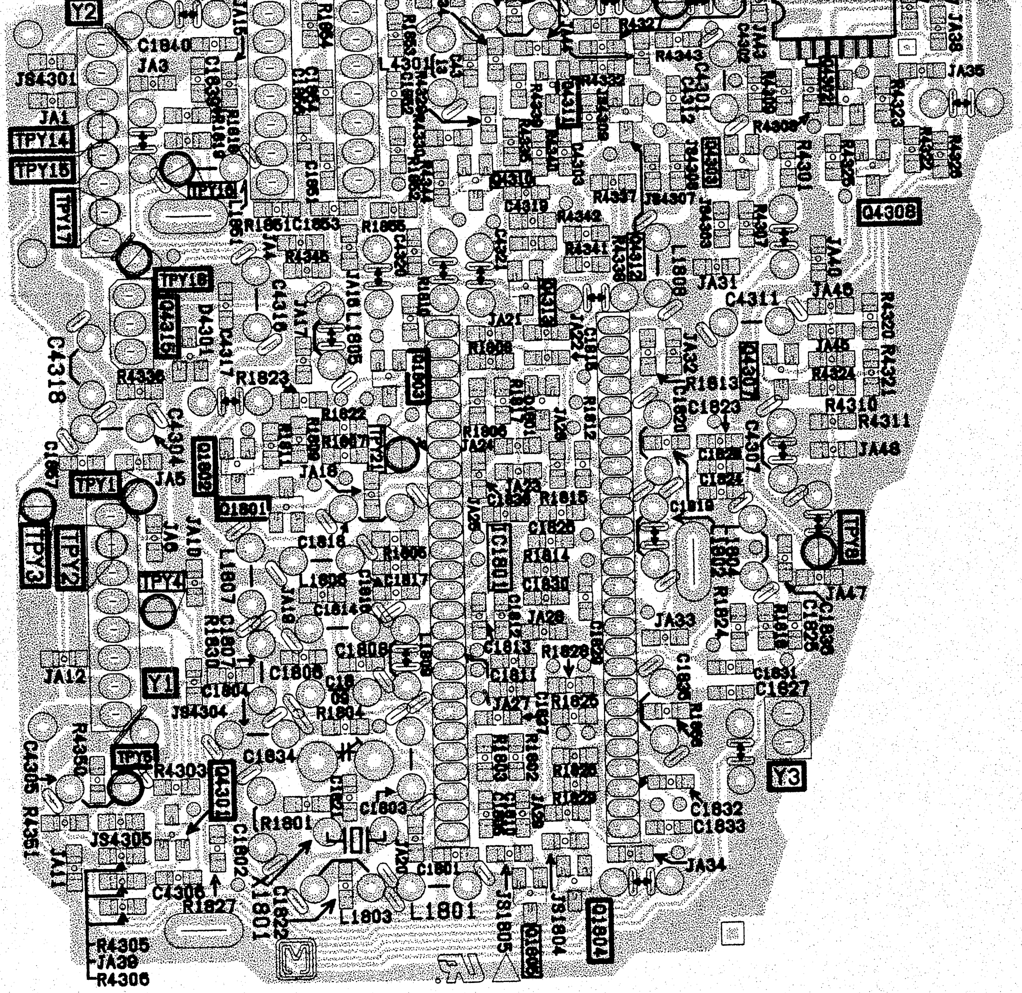

POWER
S001
R451
D452
TP292
R470
L805
A7
TP294
TP291
HOT
Q501
C510
A8
L553
B
Q551
L552
C566
C823
D554

E F G H

A-Board Layout
TNP2AH004

C-Board Layout
TNP2AA006


POWER
VOL▼
VOL▲
PH▼
CH▲
ACTION
TV/VIDEO
HOT
H.V. DANGER
HORIZONTAL
COLD
CAUTION
SEE FUSE NOTICE
6.3A 125V/250V
TNP2AH004 ①
SEE REVERSE FOR ORDER NO.
H.V. DANGER
SEE REVERSE FOR ORDER NO.
TEAMX5
94V-0
TNP2AA006
T801
T502
T501
T551
RL801
F801
JK351


Y2
Y1
Y3
C1840
JA3
JS4301
JA1
TPY14
TPY15
TPY17
TPY16
TPY1
TPY2
TPY3
TPY4
TPY8
TPY6
C4318
R4336
R1823
JA5
D1801
C1816
JA12
JS4304
C1834
R4303
R4350
C4305
R4351
JS4305
JA11
C4306
R1927
X1801
L1803
L1801
R4305
JA39
R4306
JS1805
JS1804
IC1801
Q4308
C4311
JA46
R4310
R4311
JA48
JA47
JA33
C1827
C1832
C1833
JA34
JA35
JA38
JA31
JA21
JA24
JA27
C1801
R1801
C1803

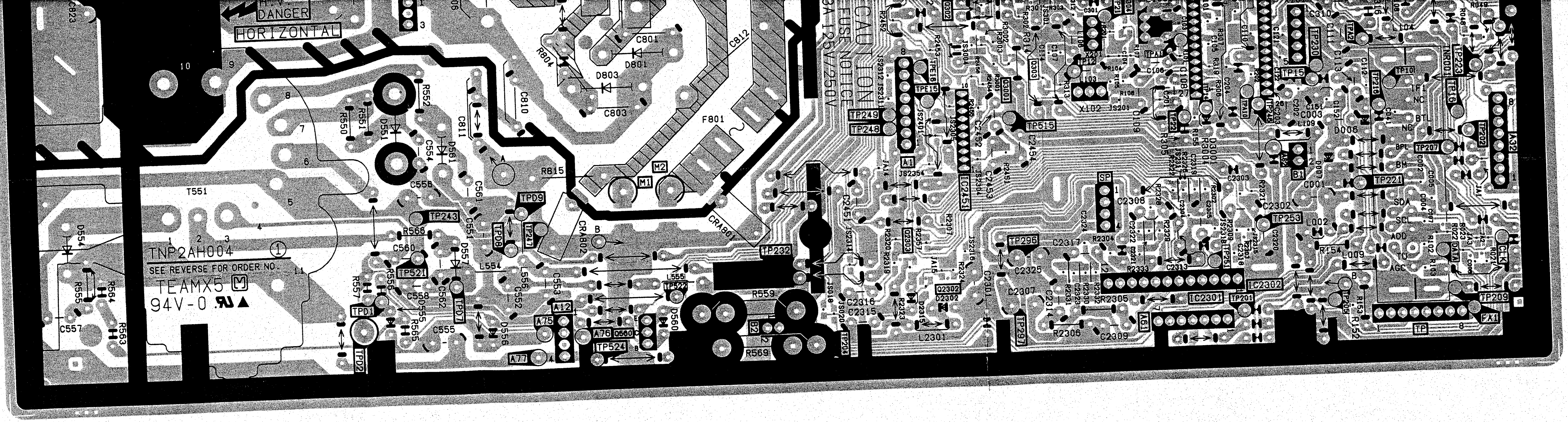
3

4

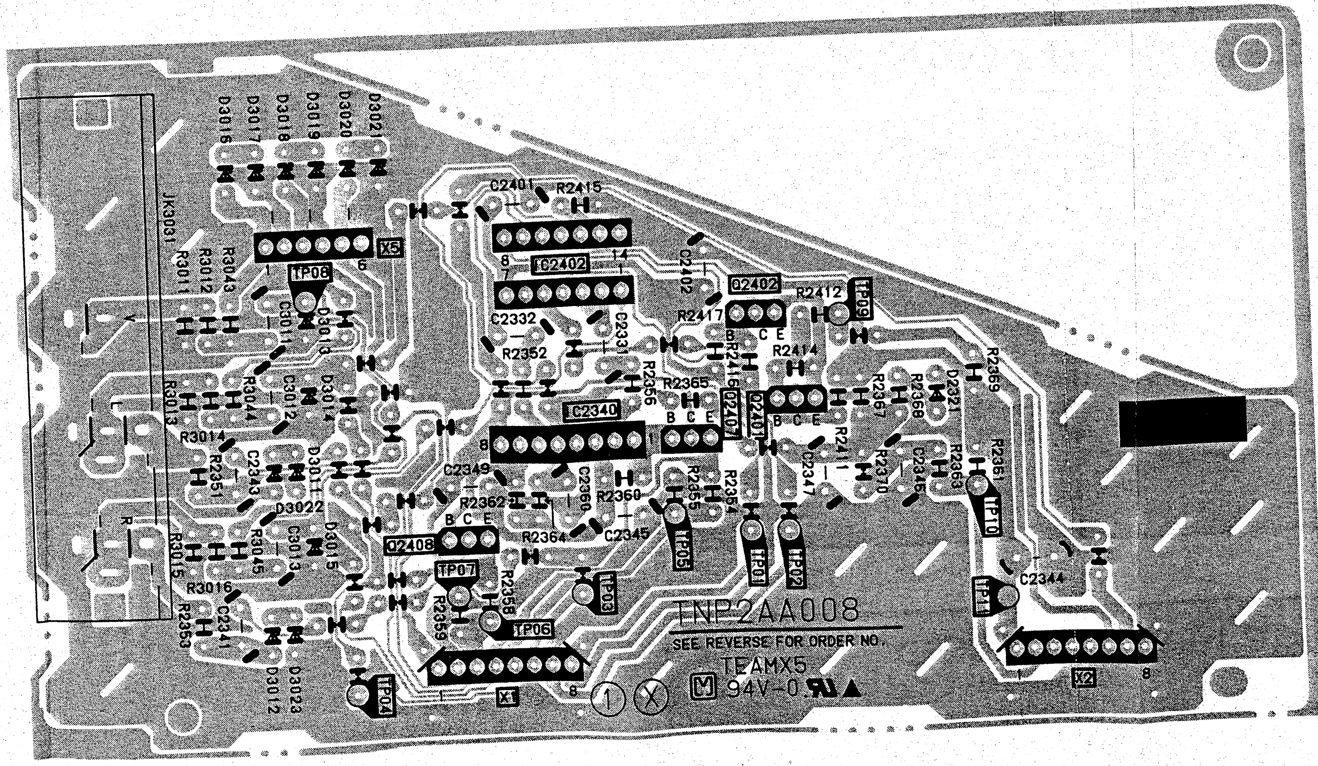
5

Board Index

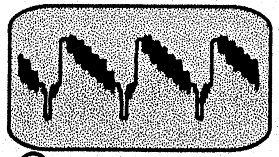
"A"–Board – Main Chassis
"C"–Board – CRT Board
"X"–Board – Input/Output Jacks, A/V Switch
"Y"–Board – PIP Processing (CT–32G22V/UV/CV only)
"Z"–Board – Pin Cushion Board

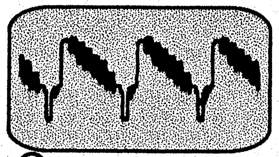

DANGER
HORIZONTAL
CAUTION
FUSE NOTICE
3A 125V/250V
TNP2AH004
SEE REVERSE FOR ORDER NO.
TEAMX5
94V-0

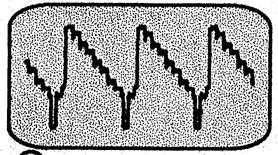
X-Board Layout
TNP2AA008
(CT-32G12V/UV/CV)

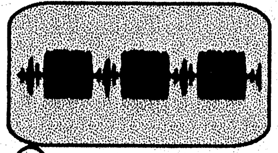

JK3001
X5
X1
X2
TNP2AA008
SEE REVERSE FOR ORDER NO.
TEAMX5
94V-0

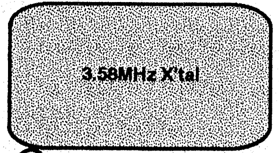
Waveforms – A-Board


① 2.6V p-p [25μs]
IC101 PIN 33 (DET OUT)

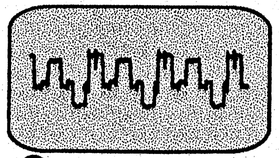

② 2.4V p-p [25μs]
TP12

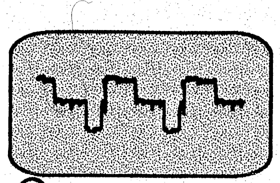

③ 2.4V p-p [25μs]
IC101 PIN 39 (Y IN)

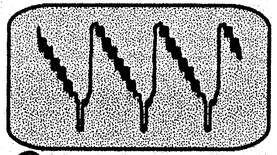

④ 1.5V p-p [25μs]
IC101 PIN 43 (C IN)

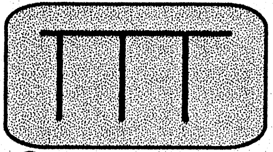


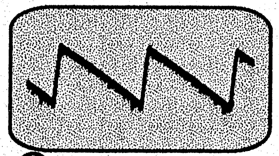
⑤ IC101 PIN 1
3.58VCO
OSC Waveform

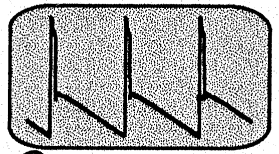

⑥ 4.6V p-p [25μs]
A11 PIN 1 (R)

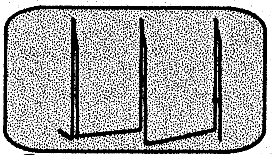

⑦ 3.6V p-p [25μs]
A11 PIN 2 (G)

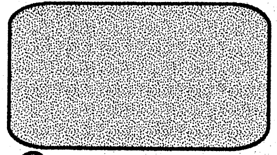

⑨ 1.3V p-p [25μs]
IC101 PIN 41 (SYNC)

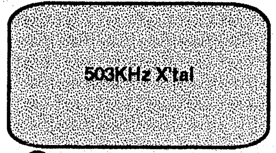

⑩ 4.4V p-p [5ms]
IC101 PIN 52 (VERT OUT)


⑪ 1.76V p-p [5ms]
IC451 PIN 7 (DRIVE)

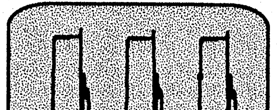

⑫ 58.4V p-p [5ms]
IC451 PIN 12 (VERT OUT)

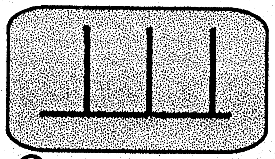

⑬ 32.4V p-p [5ms]
IC451 PIN 13

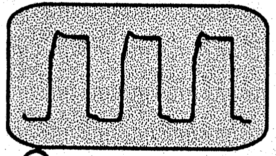

⑭ NO WAVEFROM
p-p [25μs]
IC101 PIN 47 (H AFC)

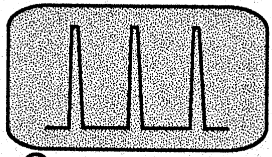


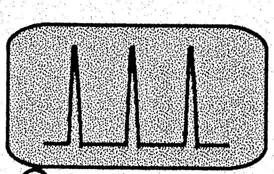
⑮ IC101 PIN 48
H OSC
OSC Waveform

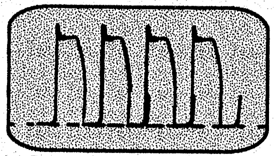


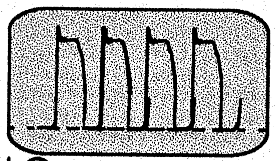

⑰ 7.9V p-p [25μs]
IC101 PIN 16 (H SYNC)


⑱ 179V p-p [25μs]
Q501 collector (H DRIVE)

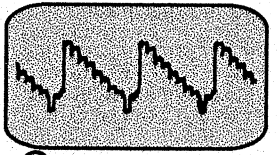

⑲ 290V p-p [25μs]
T551 PIN 1

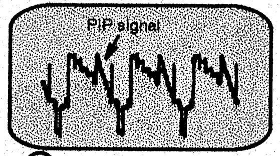

⑳ 29V p-p [25μs]
T551 PIN 6


㉑ 322V p-p [5μs]
IC803 PIN 2

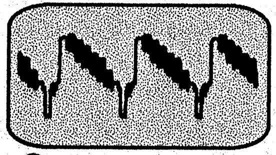

㉒ 336V p-p [5μs]
Q802 collector

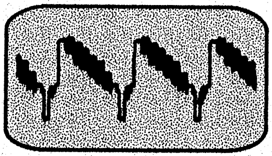
FOR CT-32G22V/UV/CV ONLY

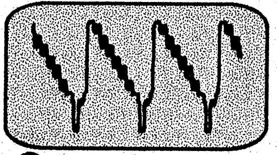

㉓ 1.0V p-p [25μs]
A31 PIN 5 (Y OUT (P)

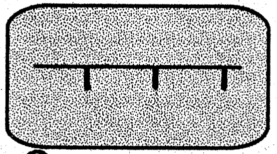


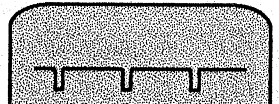
㉔ 0.87V p-p [25μs]
A31 PIN 2 (Y IN)


㉕ 0.61V p-p [25μs]
A31 PIN 4 (C OUT (P)


㉖ 0.63V p-p [25μs]
A31 PIN 1 (C IN)


㉗ 1.0V p-p [25μs]
A31 PIN 8 (C COMP)


㉘ 4.24V p-p [5ms]
A32 PIN 7 (V PULSE)



Voltage Measure
(All M

IC001			
01	5.11	33	0.00
02	3.08	34	5.07
03	1.60	35	5.14
04	3.42	36	0.00
05	5.12	37	5.13
06	2.65	38	0.00
07	0.00	39	0.16
08	0.00	40	4.10
09	0.00	41	0.00
10	5.13	42	0.00
11	1.28	43	0.00
12	0.00	44	0.00
13	2.57	45	0.13
14	0.00	46	0.00
15	0.00	47	0.06
16	3.00	48	0.00
17	0.00	49	0.00
18	4.33	50	0.00
19	0.00	51	2.49
20	0.00	52	0.00
21	0.00	53	0.05
22	5.14	54	5.26
23	-0.06	55	4.09
24	1.41	56	0.00
25	1.25	57	0.00
26	1.78	58	5.13
27	0.00	59	4.35
28	0.00	60	4.41
29	0.00	61	5.13
30	0.00	62**	2.36
31	5.07	63	2.17
32	0.00	64	0.00

**** WARNING**
CRT shuts off when probing pin. Shut Receiver off and turn back on to continue testing

IC002	
01	0.00
02	0.00
03	0.00
04	4.35
05	4.41
06	0.00
07	5.14
08	0.00

IC003	
01	5.03
02	0.00
03	5.03

IC451	
01	8.75
02	4.10
03	4.37
04	4.46
05	0.00
06	4.37
07	4.12
08	28.3
09	2.38
10	1.36
11	0.00
12	17.10
13	29.2

tage Measurements “A”-Board
(All Models)

IC001

33	0.00
34	5.07
35	5.14
36	0.00
37	5.13
38	0.00
39	0.16
40	4.10
41	0.00
42	0.00
43	0.00
44	0.00
45	0.13
46	0.00
47	0.06
48	0.00
49	0.00
50	0.00
51	2.49
52	0.00
53	0.05
54	5.26
55	4.09
56	0.00
57	0.00
58	5.13
59	4.35
60	4.41
61	5.13
62**	2.36
63	2.17
64	0.00

IC101

01	2.90	27	4.24
02	5.58	28	3.02
03	0.00	29	2.69
04	0.00	30	3.00
05	0.00	31	5.38
06	0.00	32	2.11
07	8.84	33	2.92
08	3.30	34	2.61
09	3.22	35	3.34
10	3.28	36	3.34
11	4.20	37	8.85
12	0.00	38	3.92
13	3.71	39	4.23
14	4.36	40	2.83
15	4.40	41	4.27
16	0.29	42	4.92
17	3.44	43	2.49
18	4.92	44	0.00
19	2.72	45	0.77
20	2.72	46	6.12
21	0.00	47	4.12
22	4.45	48	2.24
23	4.77	49	5.31
24	4.23	50	0.90
25	1.72	51	6.24
26	5.36	52	4.10

IC551

01	12.92
02	0.00
03	8.87

IC552

01	12.89
02	0.00
03	4.93

bing pin. Shut Receiver
continue testing

IC451

01	8.75
02	4.10
03	4.37
04	4.46
05	0.00
06	4.37
07	4.12
08	28.3
09	2.38
10	1.36
11	0.00
12	17.10
13	29.2

IC2201

01	0.00	15	3.82
02	4.35	16	4.45
03	4.40	17	4.52
04	2.10	18	4.55
05	0.08	19	0.65
06	4.63	20	4.65
07	2.69	21	0.00
08	8.88	22	4.62
09	4.39	23	0.63
10	4.47	24	4.29
11	4.48	25	4.46
12	4.34	26	4.42
13	3.03	27	5.03
14	4.47	28	6.36

CT-32G22V/CV/UV
Voltage Measurements – “Y”-Board

IC1801

01	0.00	27	3.33
02	1.49	28	3.33
03	1.63	29	0.00
04	1.67	30	0.00
05	1.65	31	0.00
06	3.34	32	0.58
07	3.34	33	0.11
08	1.02	34	3.33
09	1.53	35	3.33
10	0.51	36	0.00
11	0.00	37	2.51
12	3.33	38	1.32
13	0.87	39	2.92
14	1.54	40	1.22
15	0.50	41	1.04
16	0.00	42	0.00
17	3.33	43	1.01
18	0.00	44	3.33
19	3.33	45	1.02
20	0.00	46	3.33
21	0.00	47	0.96
22	0.24	48	0.00
23	0.03	49	0.96
24	2.89	50	0.00
25	2.86	51	1.02
26	0.00	52	0.00

	Q1801	Q1802	Q1803	Q1804	Q1805	Q4309	Q4310	Q4311	Q4312
B	0.02	3.44	3.40	0.98	1.02	2.55	2.53	4.55	0.10
C	3.68	2.89	2.86	0.00	0.00	0.00	4.88	0.40	3.34
E	0.00	3.67	3.78	1.65	1.69	3.23	1.88	4.88	0.58

	Q4313	Q4315
B	0.65	4.04
C	0.11	4.88
E	0.00	3.34

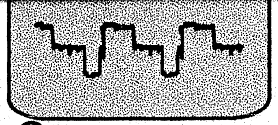
CT-32G12V/CV/UV
Voltage Measurements – “X”-Board

IC2302

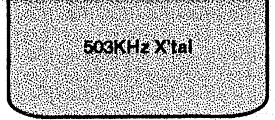
01	0.00	8	4.45
02	4.43	9	4.44
03	4.43	10	4.45
04	4.44	11	0.08

IC2340

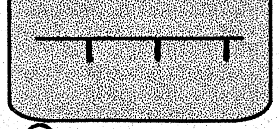
01	3.84
02	4.38
03	4.41
04	[illegible]



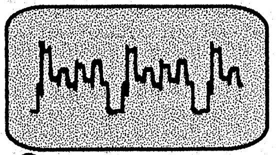
⑦ **3.6V p-p [25µs]**
A11 PIN 2 (G)



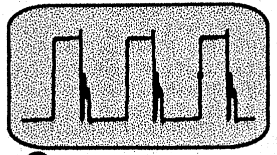
⑮ IC101 PIN 48
H OSC
OSC Waveform



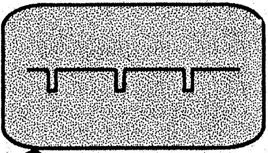
㉘ **4.24V p-p [5ms]**
A32 PIN 7 (V PULSE)



⑧ **3.9V p-p [25µs]**
A11 PIN 3 (B)



⑯ **4.1V p-p [25µs]**
IC101 PIN 50 (H OUT)



㉙ **5.6V p-p [25µs]**
A32 PIN 8 (H-PULSE)

Waveform Measurements

1. ③ indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
2. Taken with a NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.)
3. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to "MIN".
4. All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak amplitudes may vary depending on the type of Oscilloscope used and its settings.
5. Ground symbol ⏚ shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope. **CAUTION:** Incorrect ground connection of the test equipment will result in erroneous readings.

The waveforms are taken in the order of circuit flow through the various sections as follows:

VIDEO - Waveforms 1~3
COLOR - Waveforms 4~8
VERTICAL - Waveforms 9~13
HORIZONTAL - Waveforms 14~17
CRT DRIVE - Waveforms 18~20
POWER SUPPLY - Waveforms 21~22

Schematic Notes

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value noted is inductance in µH.
4. Test point indicated by ●; Test point but no pin ○
5. Components indicated with ⚠ are critical parts and replacement should be made with manufacture specified replacement parts only.
6. ▬ **(BOLD LINE)** indicates the route of B+ supply.
7. The schematic diagrams are current at the time of printing and are subject to change without notice.
8. Ground symbol ⏚ indicates **HOT GROUND CONNECTION;** ⊥ indicates COLD GROUND.
   NOTE: All other component symbols are used for engineering design purposes.

Voltage Measurements

1. Voltage measurement:
   - AC input to the Receiver is 120V. NTSC generator is connected to the antenna of the Receiver. (Color bar pattern of 100IRE white and 7.5 IRE black.)
   - All Picture and Audio adjustments are set to Normalize.
     TV ANT/CABLE - (Set-Up Menu) in TV/ANT Mode
     Volume - Min
     TV/Video SW - TV position
     Audio Mode - Stereo
   - Voltage readings are nominal and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content.
   - Supply voltages are all nominal.
2. Ground symbol ⏚ indicates ground lead connection of meter.
   Caution: Incorrect ground connection will result in erroneous readings.

08	0.00

IC003	
01	5.03
02	0.00
03	5.03

08	28.3
09	2.38
10	1.36
11	0.00
12	17.10
13	29.2

08	
09	
10	
11	
12	
13	
14	

IC2451	
01	4.42
02	1.02
03	4.42
04	8.85
05	4.43
06	0.00
07	2.70
08	4.42
09	2.32
10	4.42

IC2301	
01	1.26
02	0.00
03	18.01
04	0.00
05	0.00
06	1.25
07	9.25
08	17.20
09	0.00
10	18.30
11	17.00
12	9.47

	Q001	Q002	Q003	Q004	Q30
B	0.75	5.83	4.94	5.08	3.
C	0.08	10.74	5.80	0.00	8.
E	0.00	5.14	5.83	5.04	2.

	*Q307	Q451	Q452	⏚ Q501	⏚ Q5
B	2.01	0.00	0.16	0.00	0.
C	0.00	2.52	0.11	88.7	129.
E	2.69	0.00	0.00	0.00	0.

	Q2303	Q2306	Q3001
B	0.06	6.20	0.00
C	18.04	0.00	8.83
E	0.00	4.08	0.00

*** For CT-32G22 Only**

Voltage Measurements "C"-Board (All Models)

	Q351	Q352	Q353
B	3.27	3.19	3.24
C	157.4	160.4	155.7
E	3.06	2.97	3.05

	2.38
	1.36
	0.00
	17.10
	29.2

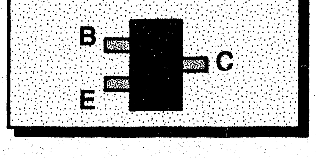
09	4.39	23	0.63
10	4.47	24	4.29
11	4.48	25	4.46
12	4.34	26	4.42
13	3.03	27	5.03
14	4.47	28	6.36

IC2301	
	1.26
	0.00
	18.01
	0.00
	0.00
	1.25
	9.25
	17.20
	0.00
	18.30
	17.00
	9.47

IC801	
⏚ 01	0.62
⏚ 02	0.00
03	0.00
04	12.17

IC803 ⏚	
01	89.90
02	132.00
03	281.00
04	131.50
05	131.50

CHIP TRANSISTOR LEAD DESIGNATION



Q003	Q004	Q302	*Q303	Q304	*Q305	*Q306
4.94	5.08	3.09	1.13	3.07	1.64	6.71
5.80	0.00	8.86	0.00	8.86	6.70	2.00
5.83	5.04	2.34	1.83	2.21	1.03	7.32

452	⏚ Q501	⏚ Q551	⏚ Q801	⏚ Q802	⏚ Q804	Q2302
0.16	0.00	0.00	0.35	0.00	130.0	18.03
0.11	88.7	129.2	130.7	0.28	0.64	0.00
0.00	0.00	0.00	0.30	0.44	130.0	18.04

3001
0.00
8.83
0.00

ements Models)

353
3.24
55.7
3.05

Voltage Measurements "Z"–Board (All Models)

	⏚ Q751	⏚ Q752	⏚ Q753
B	3.68	11.59	0.57
C	11.80	0.57	10.94
E	3.06	12.12	0.00

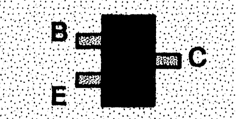
CT–32G12V/CV/UV Voltage Measurements – "X"–Board

IC2302			
01	0.00	8	4.45
02	4.43	9	4.44
03	4.43	10	4.45
04	4.44	11	0.08
05	7.34	12	0.00
06	7.34	13	0.00
07	0.00	14	8.85

IC2340	
01	3.84
02	4.38
03	4.41
04	0.00
05	4.08
06	4.38
07	3.83
08	8.85

	Q2401	Q2402	Q2407	Q2408
B	0.19	0.08	3.84	3.84
C	7.34	0.00	8.85	8.85
E	0.00	0.64	3.23	3.22

CHIP TRANSISTOR LEAD DESIGNATION



CT–32G22V/CV/UV Voltage Measurements – "X"–Board

IC2340	
01	4.09
02	4.43
03	4.46
04	0.00
05	4.14
06	4.43
07	4.07
08	8.96

IC2402	
01	3.19
02	4.51
03	4.51
04	4.51
05	8.18
06	8.18
07	0.00
08	4.55
09	4.55
10	4.55
11	3.19
12	0.00
13	0.00
14	8.96

IC3001	
01	4.63
02	0.00
03	3.19
04	0.00
05	3.21
06	3.20
07	0.07
08	4.63
09	4.63
10	0.00
11	4.63
12	0.00
13	8.96
14	4.63
15	0.00
16	4.64

IC3031	
01	4.63
02	0.23
03	3.19
04	0.00
05	3.19
06	3.19
07	0.23
08	4.62
09	4.63
10	0.00
11	4.63
12	0.23
13	8.96
14	4.63
15	0.00
16	4.63

IC4402	
01	4.64
02	0.00
03	4.64
04	8.96
05	0.05
06	4.63
07	0.00
08	4.63
09	4.63
10	0.05
11	3.19
12	3.19
13	0.00
14	3.20
15	0.05
16	4.63

	Q2401	Q2402	Q2407	Q2408	Q3011	Q3012	Q3013
B	0.06	0.62	4.09	4.07	6.69	2.07	4.01
C	8.18	0.00	8.96	8.95	8.96	4.62	8.96
E	0.00	0.00	3.51	3.49	6.07	1.44	3.97

	Q3014	Q3201	Q3202	Q3203	Q3204	Q3205
B	3.20	5.94	2.48	2.48	4.46	4.47
C	0.00	8.95	4.47	4.48	8.96	8.96
E	3.88	5.29	1.86	1.86	3.81	3.84